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16 OCT 1958
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AGRICULTURAL *Chemicals*

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- Controlling Plant Odors
- Protective Respirators
- Fertilizer-Nematocides
- Orchard Pest Control
- Selling Fertilizer
- Pests in Stored Grain
- Wildlife Research Studies

SEPTEMBER, 1958

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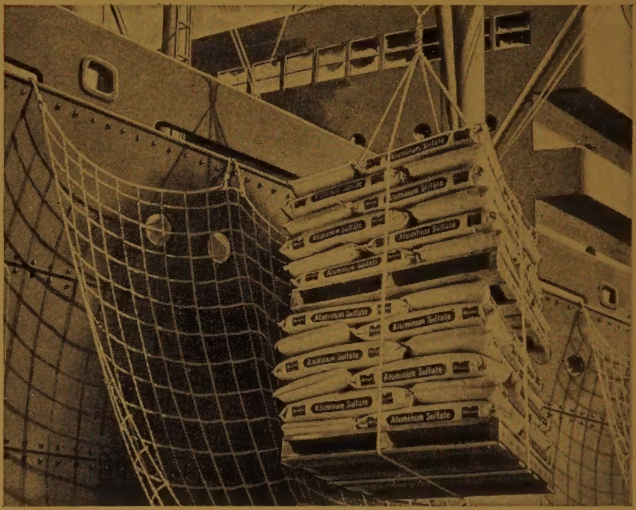

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This Month's Cover

Prominent in the news this month were: (A) Senator Magnuson, whose bill S. 2447, authorizing continued research on effect of pesticides on wildlife was made into a law, (story page 33).

(B) R. E. Bennett, NPFI president, presided at regional meeting on expanded NPFI program (story page 80)

(C) Vincent Sauchelli, chairman of the Fertilizer Industry Round Table, and moderator of an ARI panel (story page 50).

(D) J. V. Vernon, NAC president, who will preside at 25th annual meeting next month in Savannah, Ga. (Story page 65).

Vol 13, No. 9 September, 1958

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Trade Listing

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute, 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

Regional Offices listed on page 123.

American Society of Agronomy, 2702 Monroe St., Madison Wisc. L. G. Monthey, executive secretary.

American Phytopathological Society, S. E. A. McCallan, secretary. Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino California.

Chemical Specialty Manufacturers' Association, 110 East 42nd St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

Mid-West Soil Improvement Committee, 121 West Wacker Drive, Chicago 1, Ill. Z. H. Beers, executive-secretary.

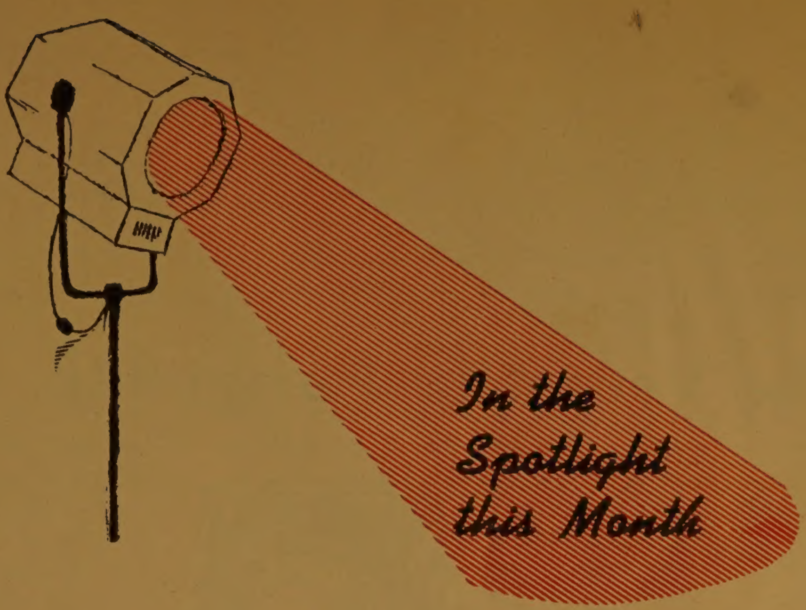
National Nitrogen Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, PO Box 9905, Memphis, Tenn.

Soil Science Society of America, 2702 Monroe St., Madison, Wisc. L. G. Monthey, executive secretary.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association. Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.


In the Spotlight this Month

- **Fertilizer Odors . . .** Description of an installation for fertilizer plants to counteract obnoxious odors. Basis of deodorization is liquid odor counteractants, which are vaporized into the air stream. They combine with the malodors to reduce or neutralize the effect. Page 20.

- **Respirator Devices . . .** Conclusion of a two-part article on respiratory protective devices, discussing specific units, and specific uses. Page 22.

- **Selling Fertilizer . . .** Reviewing some of the basic concepts of selling and their application to the fertilizer industry. Applicable to all selling, and particularly important in the current market, when salesmen have to get back to "selling," instead of "order taking." Page 27.

- **Pest Control in Grain . . .** Studies on use of ryania in grain handling and storage. Results of tests indicate that ryania formulations tested protected stored wheat and shelled corn through long periods of storage. Page 31.

- **Fertilizer-Nematocide Mixtures . . .** Applying nematocides in a fertilizer mixture offers the farmer the saving of a second application, -plus the further advantage of having the fumigant right in the row where it does the most good. Page 25.

- **Orchard Pests . . .** New pesticides which look promising for controlling pests in Washington orchards are reviewed. Included are comments on: Sevin, Guthion, Diazinon, Trithion, Aramite, Chlorobenzilate, Phosphadrin, Systox, Dithane, Sytam, Compound 12880, Dieldrin, Endrin and Toxaphene. Page 27.

- **Applicating Equipment . . .** Description of a newly designed tractor-trailer unit for row crop spraying. The spray trailer has a 300-500 gallon capacity, sprays 8 40″ beds per swath. Page 38.

Is there another
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advantages?

- Longer Protection
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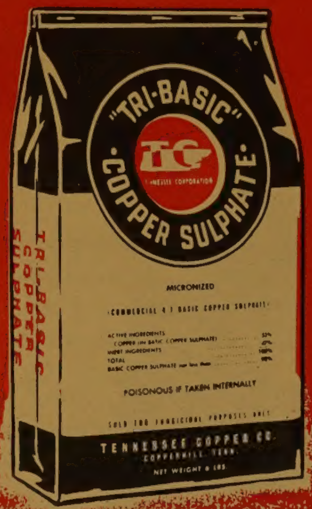

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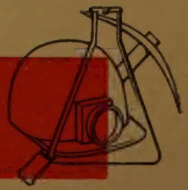

A MATTER OF FACT . . .

—of extreme importance to the Industry is the following statement by the Hon. Alexander Wiley, Senator from Wisconsin, before the Senate of the United States:

MR. President, I was very much interested to read of plans for the celebration of the silver jubilee of the National Agricultural Chemicals Association, this coming October, at a meeting in Savannah, Ga.

It may not be realized offhand, by folks unfamiliar with the chemical revolution in American agriculture, just how indebted we are to chemistry. Yet, on close examination, one readily sees that not only the American farmer, but the public as a whole, is deeply indebted to the miracles which have been wrought by chemical compounds as applied to agriculture.

By means of these compounds, used for the benefit of man, we have had bigger crops, better crops, with less sweat and toil; we have had better livestock, we have had healthier Americans. And the benefits of the chemical revolution in America have spread throughout the world, as well.

Chemical fertilizers have received a good deal of public attention, but less attention has been focused on the so called cides—insecticides, herbicides, rodenticides, and fungicides. Yet these chemicals, dedicated to the never-ending battle of man against the ravages of nature, have changed the life of every one of us for the better.

It is estimated that pests continue to cost the American economy no less than $9 billion a year.

That money comes out of the pocket of the American farmer; but it comes out of the public's pocket as well.

Insects, alone, may cost us $4 billion or so. Rodents cost us far in excess of a billion dollars a year.

Weeds, alone, may cost up to $4 billion a year.

Naturally, as damage from pests is minimized, the farmer is enabled to make economies available to the public..

The fact that we have bigger crops may mean that we must meet more directly the farm-parity problem; but that is certainly no reason for us to be concerned.

Today, the chemical industry in America is one of our greatest industries; and agricultural chemicals represent an important segment of that industry.

Like all industries which are based on science, research plays a major role. It is estimated in the May 1958 issue of NAC News and Pesticide Review that pesticide chemical manufacturers are now spending more than $20 million a year on research and development. This is a jump of 150%, as compared with 1950.

Involved in the increased research are many new laboratory facilities, experimental farms and grants-in-aid to State Agricultural Experiment Stations. In addition, Federal Government agencies are now spending some $5 million in research in this field, alone.

This is basically a private enterprise industry. Ninety-three percent of crop protectants come from industrial research; rather than from that of tax-supported institutions.

Last year a quarter of a billion dollars represented the value of pesticides at the manufacturer's level.

Naturally I am interested in this subject because, representing as I do a great farm State, I know how crucial chemical research is in meeting the farm problems of Wisconsin. But I am interested, as well, in the health of all of American agriculture and, far more important, the health of the American people as a whole.

I am interested that the farm industry shall receive maximum encouragement to break new trails in research.

I am interested in ever-improved safety standards—a subject in which the industry, itself, is deeply interested, as well.

I know that research pays off in countless direct and indirect ways; that for every dollar so invested, the public will receive untold benefits.

The world's population is increasing and must be fed. America's population is increasing, and it wants to be fed better than ever before.

I send, then, to the National Agricultural Chemicals Association congratulations on their 25th milestone and my wishes for uninterrupted success in continuing to serve the needs of America.

I send to the desk the text of a most interesting chart which was published in that same May 1958, issue of the NAC News and Pesticide Review. It is entitled "Twenty-five Years of Miracles," and it shows in simplified, tabular form, what has been accomplished in these brief 2½ decades in major pesticide chemical work.

I ask unanimous consent that this page be printed in the Appendix of the RECORD.

— Reprinted from the Congressional Record, July 17, 1958 —

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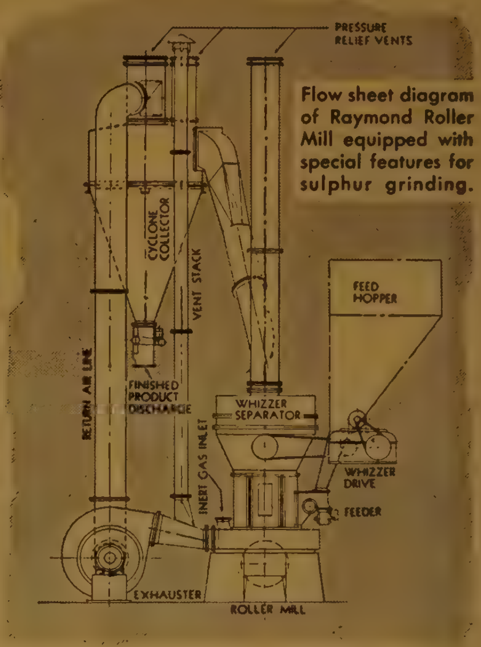

Flow sheet diagram of Raymond Roller Mill equipped with special features for sulphur grinding.

The safe and trouble-free production of dusting sulphur and sulphur-bearing insecticides is a job for which the Raymond Roller Mill is preeminently fitted. It has become the standard unit for this purpose because of these advantages:—

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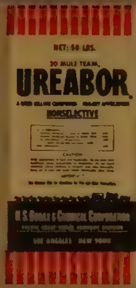
4 *easy ways to* destroy weeds

1



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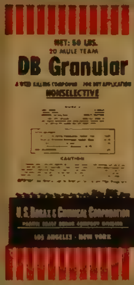

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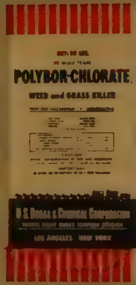
3



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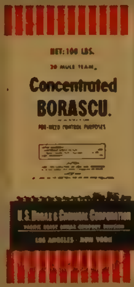

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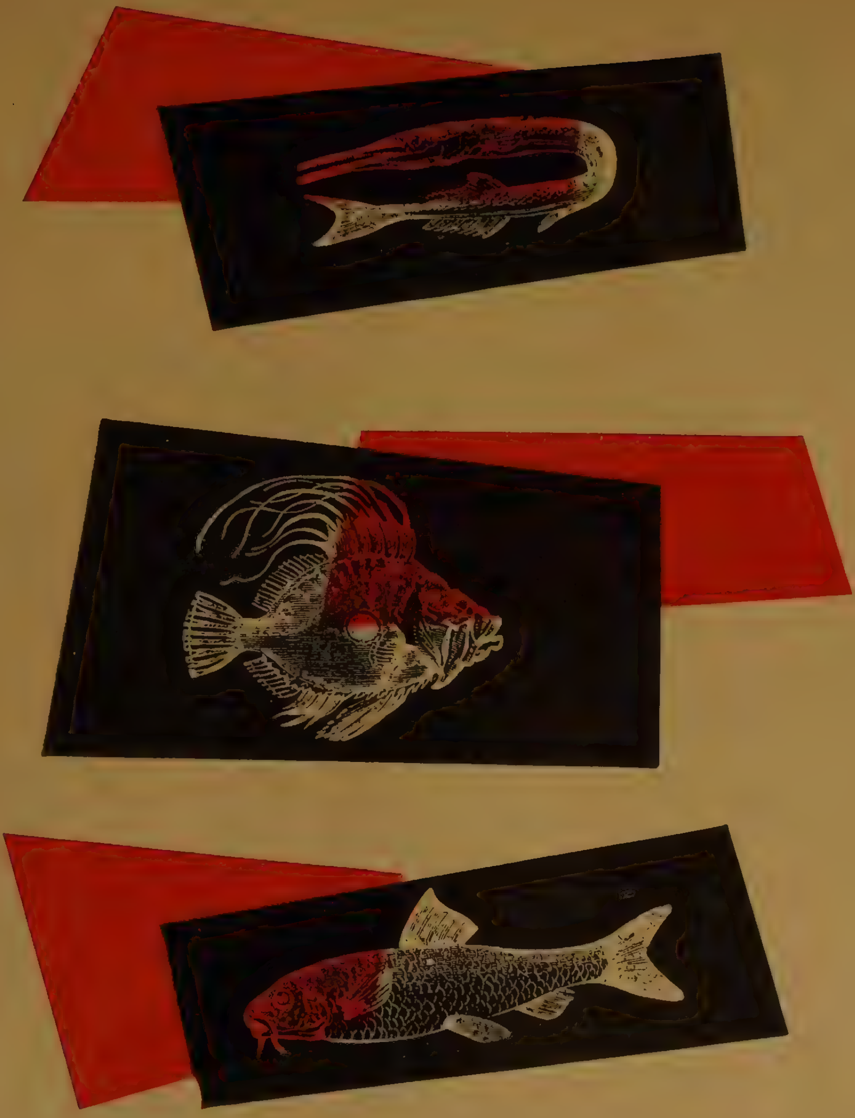

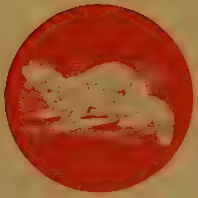

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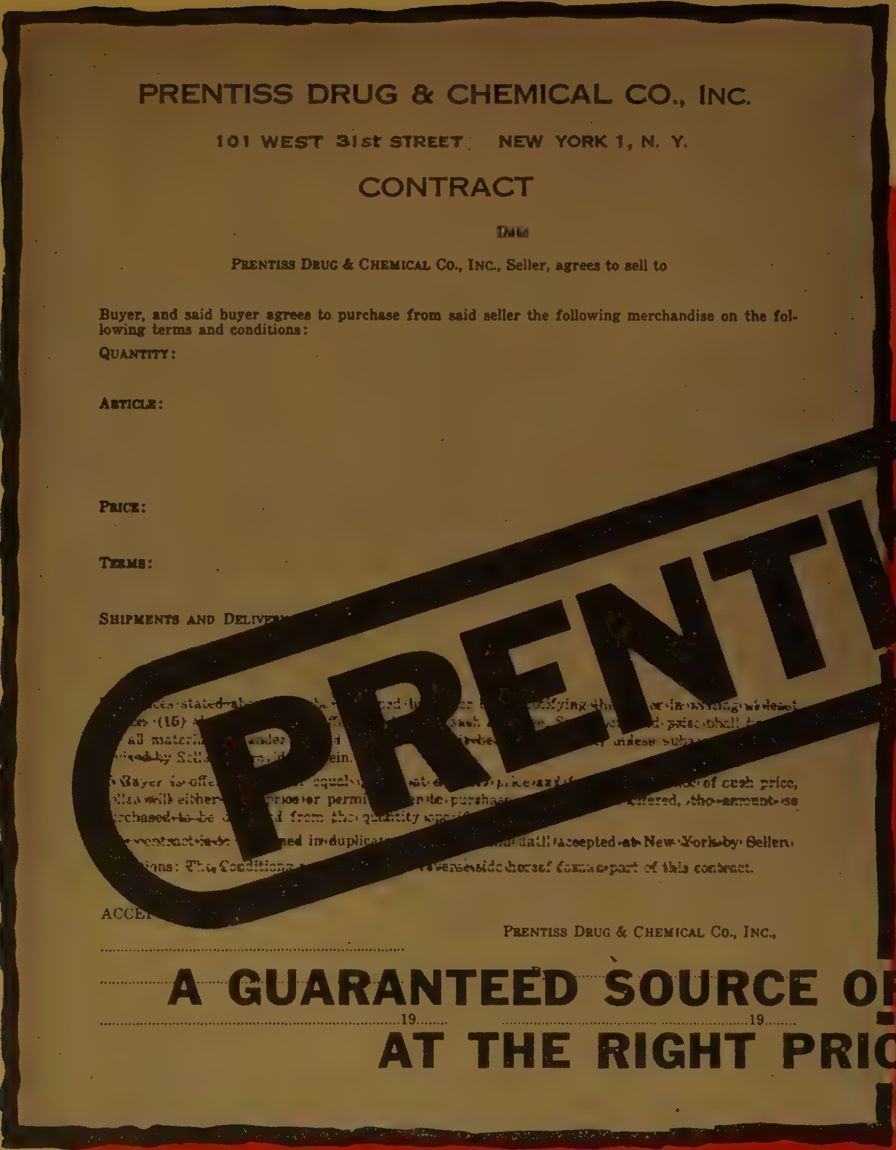

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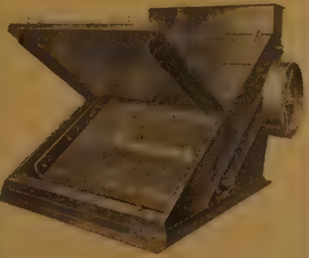
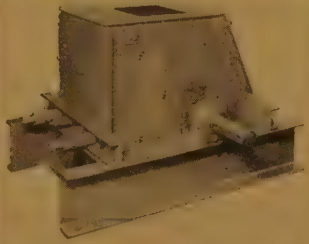
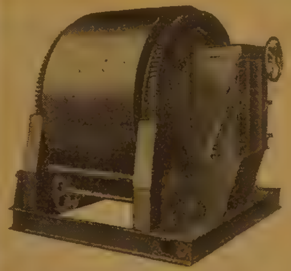

B-B SCREEN


ROTARY PULVERIZER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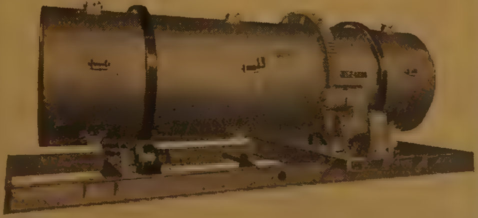
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MATERIALS	LBS
TREBO-PHOS Triple Superphosphate—(APA 48.28%; Ins. 1.04%; H_3PO_4 3.09%; Moisture 7.25%.)	628
Normal Superphosphate	493
Nitrogen Solution: (25% NH_3; 69% NH_4NO_3)	62
Anhydrous ammonia	88
H_2SO_4, 66° Be	130
Potash	645

3. **RESULTS**

Production rate: 20 tons per hour
Through-put production: 82%
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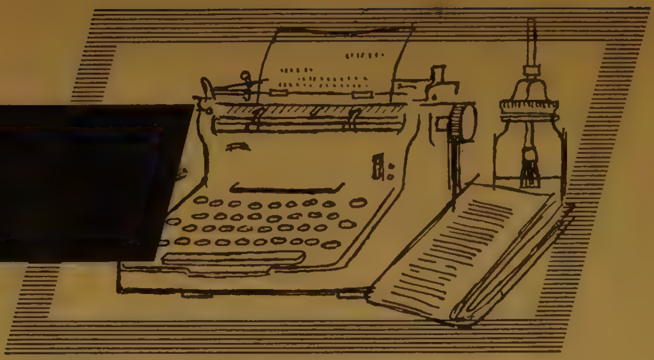
EDITORIALS



THE recent action by the U. S. Food and Drug Administration in sharply increasing fees for the establishment of tolerances under the Miller Act has the insecticide industry up in arms. The increases are definitely major, and will add one more substantial item to the already staggering cost of bringing new products on the market. They will keep many valuable new products off the market, or at the least sharply restrict their use, unless the decision to saddle this expense on the pesticide manufacturer is reversed.

Industry's position on the subject of fees was brought out at the hearings when the Miller Amendment was originally pending in Congress. It was that the law is for the protection of the public and not for the benefit of those manufacturing pesticides and seeking tolerances. Accordingly, it was asserted, the costs of administration of the law should be a regular part of FDA's operational expense. It is no more just and no more practical to levy the cost against the pesticide manufacturer than it would be to ask the applicator, the farmer or the food packer to pay the bill.

The National Agricultural Chemicals Association has taken a strong stand in opposition to this new tax on pesticides, and has indicated that it will seek an amendment to the present law to eliminate all fees on establishment of pesticidal tolerances. It points out, cogently, that when the amendment was pending it had been proposed that all government service be made self-supporting through collection of fees. No such program has been put into effect, however. Legislation introduced last year by the FDA covering use of chemicals in or on food provides for no comparable fee system, the NAC points out.

And on the well known basis of "what's good for the goose is good for the gander," they ask, "Why another tax on pesticides?"

* * * * * *

THE expanded organization and program of the National Plant Food Institute are beginning to bear fruit—and show results. It was only logical to anticipate that, following the decision a year or so ago to widen the activities of the organization, there would necessarily be a delay in getting under way with the ambitious program. The preliminaries of organization had to be attended to, new staff located, engaged and trained, and the wide network of branch offices established.

All that is now behind us, and concrete results from the expanded organization are starting to come through. Elsewhere in this issue we devote several pages (80, 82) to reports on activities in which the NPFI staff is engaged, stimulating the expanded use of plant foods.

We have always been rather impressed by the thought that you get about what you pay for in a machine, a magazine or an organization, and we have always believed strongly that those who expect results should be willing to pay for them. It is fortunate for the fertilizer industry, we are sure, that there were enough forward-looking expansion-minded individuals running the affairs of the NPFI who were willing to face and underwrite the cost of this sharply expanded program. It will, we are equally certain, return big dividends in the years ahead in terms of an expanding market for plant food.

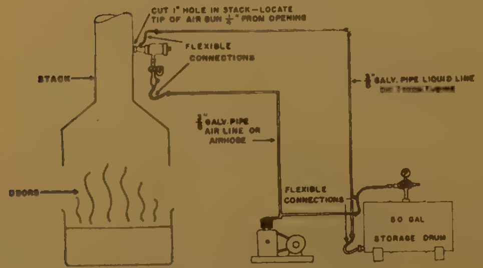
ODOR CONTROL in the fertilizer industry

ODOR problems are not new to the fertilizer industry. What is new, however, is an increasing awareness of the importance of removing the source of friction between this major industry and its neighbors. In the case of major plants the problem is often one created by the expansion of suburban areas up to the plant site. In other cases, it is the increased interest in fertilizer production which has brought about the construction of new plants in areas where residences and businesses of a general commercial nature have been present for some time.

Most odors are identified by comparing them with something similar. For example, hydrogen sulphide is described as a rotten egg type odor. If we could not use the comparison of rotten egg it would be difficult to describe the odor of hydrogen sulphide. For the most part, it is difficult to describe or characterize specific odors. While most people can smell, the degree or sensitivity will vary widely with each individual. Some can easily detect odors in concentrations of 1 part in a billion. Others may find it difficult to determine odors in concentrations as high as 10 or 100 parts in a million. Even with these wide variations in an individual's sense of smell, the nose is the most sensitive analytical device known today for detecting odors. Psychology also plays a large part as do the physical characteristics of the individual. Because of the close relationship of reactions to odors to the emotional make-up of the public, malodors often create very bad public relations situations.

Because of the types of odors generally coming from a fertilizer plant, it has been difficult for the industry to economically and yet practically control the problem. In recent years, a firm specializing in the control of industrial odors has undertaken to present a simplified and effective method of solving this problem. Airkem, Inc., New York, has installed odor control equipment of relatively modest initial cost at several industrial firms.

The equipment installed at the Koppers Company plant in St. Paul, Minnesota, is typical of the type of equipment installed in a chemical fertilizer plant. The Koppers plant site is in an area surrounded by both commercial and manufacturing businesses, as well as a residential area. Odor problems had been called to the attention of management on a sporadic basis for several years, but only recently had this matter become of very serious concern. The company was anxious to solve the problem because of the traditionally good community relations enjoyed by them.


CUT 1" HOLE IN STACK—LOCATE TIP OF AIR GUN ½" FROM OPENING
FLEXIBLE CONNECTIONS
STACK
⅜" GALV. PIPE LIQUID LINE
⅜" GALV. PIPE AIR LINE OR AIRHOSE
ODORS
FLEXIBLE CONNECTIONS
50 GAL STORAGE DRUM

TYPICAL LAYOUT FOR SPRAY GUN OPERATION

A test installation made under the supervision of the plant superintendent was set up by the Airkem distributor in Minneapolis. Airkem representatives are trained by a group of engineers and chemists at the New York headquarters. Much of their knowledge of odors is derived from the work of the technicians in the parent company odor laboratory which is the largest of its kind in the world.

During the test period, a survey was made by plant officials checking the odor level in various neighborhoods adjacent to the plant to determine the effectiveness of the installation from the viewpoint of the local citizenry.

The installation consisted of a compressed air operated spray gun mounted at the top of a cooling tower used to cool condensed water for the exhaust arising from the manufacture of ammonium sulfate. It is interesting to note that the Airkem vaporizing equipment was mounted on the major unit that was installed to wash out odors from the exhaust gases. This cooling tower proved ineffective in reducing the basic odor problem.

The product vaporized by the compressed air operated spray gun actually represents the real difference between this odor control installation and the systems previously tried at the plant. The product is described as an odor counteractant, in other words a product which reacts with the odor in a physical and chemical sense. This is quite distinct from attempts to perfume the atmosphere.

The theory of odor counteraction is based on the work performed by Hendrick Zwaadermaker, a Flemish scientist, at the end of the 19th century. This theory employs the principle that certain odors are antagonistic to other odors. The counteractants are therefore a balanced combination of odor pairs or opposites. It is upon this principle that the Airkem odor control products or odor counteractants were developed. The Airkem liquid counteractant is vaporized into the air stream and by molecular dispersion combines with the malodors traveling along the windstream wherever the malodor is carried. For practical purposes an odor is always a gas. Vaporizing the odor counteractants by means of air operated nozzles disperses the counteractant into the atmosphere in a gaseous form which combines with the malodor lowering the malodor below the threshold of perception.

By vaporizing counteractants into the atmosphere in this manner, neutralization of the malodor is effected whether the odors are held to the ground or disposed horizontally or vertically by the wind currents. Vaporizing points are usually located in or near the stack exhaust, but they may also be located at the plant roof top and in the vicinity of most odorous exhausts. The mechanical effect is very similar to that which would be accomplished by using a large aerosol bomb.

Airkem has often been asked whether an odor that has been treated by odor counteraction is permanently removed. Proof of permanence has been demonstrated over a period of several years. Airkem, during a single year, treated 2,079 individual cases of odor-contaminated material to remove a specific odor. In 10 cases there was some doubt as to permanence. These cases were referred to individual testing laboratories such as the U.S. Testing Laboratory. These laboratories reported that to the full extent that the material could be treated, the odor was permanently removed. There has been no question regarding the remaining 2,069 cases.

This simplified approach to odor control makes possible the quick and inexpensive reduction of a major community relations problem. Fertilizer plants can be free of the common stigma given them by the community. Indeed, they can conceivably be as socially acceptable to a business community as any other important industry.★★

Photos from left to right:

Typical layout for spray gun operation.

Ammonium sulfate fertilizer being loaded in a wheelbarrow at Koppers plant in St. Paul.

Cooling tower which was installed originally to relieve the odor problem at the Koppers plant. It now serves as a convenient mounting for the Airkem spray gun.

Close up of the Airkem spray gun mounted on top of the cooling tower.

Respiratory Protective Devices

CONCLUSION

By R. A. Fulton and Floyd F. Smith
Entomology Research Division, Agrictutural Research Service
U. S. Department of Agriculture, Beltsville, Md.

Tests With Various Insecticides

PARATHION was the first organic phosphorous insecticide to be tested in commercially available respirators and gas masks. No suitable absorbing material by itself was found for this compound. The addition of a dust filter, such as loose-fibered blotting paper, in the cartridge reduced the amount of parathion passing through the assembly. Filters with fibers of more uniform diameter reduced the parathion below 0.5 p.p.m. When HETP and TEPP were tested, the filters that had been found satisfactory for parathion allowed a high percentage to pass through. Filters that had been standardized for 0.7-micron particles were effective in removing these materials from the air stream. Since TEPP has no odor, an absorbent was not needed, and it was possible to use a loose, thick, deep filter to decrease the breathing resistance.

When demeton came into use, it was necessary to use a thin filter with a 0.5-micron particle retention plus a chemical cartridge to remove the odor of the impurities. The filter-cartridge combinations developed for demeton were effective against all the previously tested organic phosphorus compounds, and all the newer ones except Phosdrin. To remove Phosdrin from the air, a filter with a particle retention of 0.3 micron was required. One such filter was made from a uniform, fine-fiber felt and another from a mixture of glass and sparta fiber (from the North African plant *Esparto tenacissima*) deposited on a suction plate.

The efficiency of various cartridge filters for the organic phosphorus insecticides is shown in Table 1. The 0.3-micron filter was the most effective for this group of compounds.

The chlorinated hydrocarbon insecticides produce vapors that are not removed by filtration. The most satisfactory arrangement for these insecticides is a combination of a filter to remove the particles and a chemical cartridge to remove the vapor. The filter prolongs the life of the cartridge. The results of tests with filters alone and with a chemical cartridge are shown in Table 2.

Although filters alone will remove the toxic ingredients of organic phosphorus insecticides, it is necessary to use chemical cartridges too for most of these compounds to remove the odors due to the impurities. To eliminate the need for several respirators, the more recently developed units have been designed to protect against all the insecticides and fungicides in common use.

Effective Respirators and Gas Masks

Respirators and gas masks that have been tested and found effective against certain insecticides are listed below.

Respirators

A. Respirator-No. 5055 equipped with R-55 filter and cartridge

TABLE 1

Results of tests with four organic phosphorus insecticides using aphids to determine the efficiency of various filters in respirator cartridges. Numbers of insects alive (A) or dead (D)

Filter size (micron)	Parathion						TEPP						Demeton						Phosdrin					
	Aphids		Mites				Aphids		Mites				Aphids		Mites				Aphids		Mites			
			Adults		Larvae				Adults		Larvae				Adults		Larvae				Adults		Larvae	
	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A
1.5	0	155	0	251	1	162	259	0	125	0	139	0	312	0	216	0	148	0	—	—	—	—	—	—
1.0	2	161	0	236	1	171	322	0	43	2	320	0	—	—	—	—	—	—	—	—	—	—	—	—
0.7	3	196	0	183	1	216	3	129	1	136	0	243	150	0	104	29	88	3	155	0	194	33	21	0
.5	0	185	0	146	1	212	3	186	0	263	3	26	25	137	5	119	2	104	114	3	11	144	2	34
.3	–	—	–	—	–	—	3	148	2	156	0	52	—	—	—	—	—	—	0	112	2	64	2	23

unit. Two units attached to facepiece. (American Optical Company)

B. Healthguard Respirator style 95, equipped with Code B cartridge and filter 1000 or 1001. One unit attached to facepiece. (Chicago Eye Shield Company)

C. DCA 6100 Respirator with Para-A cartridge and DC 6100-7 felt filter. (Pulmosan Safety Equipment Corporation)

D. Agrisol Dust and Vapor Respirator, equipped with R-414 filter and 11-A cartridge. Two units attached to facepiece. Ray-O-Vac Company, Willson Products Division)

E. Respirator No. 5561, equipped with filter cartridge combination R-561. (American Optical Company, Safety Division)

F. Farm Spray Respirator No. CR-72183, equipped with cartridge No. CR-49293 and filter No. 73488. (Mine Safety Appliances Company)

G. All Vision Chemical Cartridge Respirator No. CR-74910, equipped with inner cartridge No. CR-73841 and outer cartridge No. 73927. (Mine Safety Appliances Company)

H. Agritox Respirator, equipped with cartridge No. 11A (new type) and filter No. R490. (Ray-O-Vac Company, Willson Products Division)

I. Respirator No. 5058, with filter-cartridge combination R-58. Company, Willson Products Division)

J. C-214 Respirator with CMP cartridge and C-241-7 filter. (Pulmosan Safety Equipment Corporation)

Gas-Mask Canisters

1. Chin Style Canister No. 15 or OVAG-F Insecticide Canister. filter-cartridge Combination R-58. pany)

2. Canister GMC-1. (Mine Safety Appliances Company)

3. Canister G3FD. (Ray-O-Vac Company, Willson Products Division)

4. Universal type canister of any manufacturer. Type N, bearing Bureau of Mines approval.

5. Military Canister No. 10 (Army Type). (Acme Protection Equipment Company)

TABLE 2

Results of tests of chemical respirator cartridges with dust filters and of fume filters alone against several chlorinated hydrocarbon insecticides

Filter size (microns	Insecticide (micrograms per liter)			
	Dieldrin		Aldrin dust	Chlordane dust
	Dust	Spray		
	Iodine-activated charcoal plus filter			
1.5	0.4	0.6	0.4	0.3
	.6	.4	—	—
	.2	—	—	—
1.0	.4	.8	.8	.3
0.5	.2	—	—	.3
	.3	.6	.3	.3
	Fume filter only			
1	2.9	3.6	—	—
.3	1.2	—	—	—

1Size not stated but classified as fume filter.

TABLE 3

Respirators and gas-mask canisters that will protect against dusts, mists, and low vapor concentrations of certain insecticides. Numbers refer to preceding list. Plus sign (+) indicates acceptability.

Insecticide	Respirators										Gas-mask canisters					
	A	B	C	D	E	F	G	H	I	J	1	2	3	4	5	6
Aldrin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Chlordane	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Dieldrin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Endrin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Thiodan					+	+	+	+	+	+	+	+	+	+	+	+
Bayer 19639					+	+	+	+	+	+	+	+	+	+	+	+
Am. Cyanamid 12008					+	+	+	+	+	+	+	+	+	+	+	+
Chipman R-6199[1]					+	+	+	+	+	+	+	+	+	+	+	+
Chipman K-6200[1]					+	+	+	+	+	+	+	+	+	+	+	+
DDVP					+	+	+	+	+	+	+	+	+	+	+	+
Demeton					+	+	+	+	+	+	+	+	+	+	+	+
Diazinon					+	+	+	+	+	+	+	+	+	+	+	+
Dicapthon (Am. Cyanamid 4124)					+	+	+	+	+	+	+	+	+	+	+	+
Dow ET-57 (Korlan)					+	+	+	+	+	+	+	+	+	+	+	+
EPN	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ethion					+	+	+	+	+	+	+	+	+	+	+	+
Hercules 528 (Delnav)					+	+	+	+	+	+	+	+	+	+	+	+
Malathion	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Methyl parathion	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parathion	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Phosdrin								+	+	+	+			+	+	+
Phostex					+	+	+	+	+	+	+	+	+	+	+	+
Schradan					+	+	+	+	+	+	+	+	+	+	+	+
Sevin					+	+	+	+	+	+	+	+	+	+	+	+
TEPP					+	+	+	+	+	+	+	+	+	+	+	+
Thimet					+	+	+	+	+	+	+	+	+	+	+	+
Trithion					+	+	+	+	+	+	+	+	+	+	+	+
Nicotine	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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[1] Chipman R-6199 is the hydrogen oxalate and chipman R-6200 the paratoluenesulfonate salt of *O,O*-diethyl *S*-(2diethylamino) ethyl phosphorothioate.

6. Canister No. H-3, equipped with facepiece filter holder and throw-away filter No. R361or R393. Can be obtained with either a full-face gas mask or a half-mask facepiece. The half-mask facepiece should not be used when mixing or handling insecticides in enclosed spaces or applying aerosols in greenhouses, but is suitable for field use. (Ray-O-Vac Company, Willson Products Division)

The addresses of the companies supplying respirators and gas masks are given below. Respirators also available from insecticide distributors and mail order houses.

Acme Protection Equipment Company, 1201 Kalamazoo St., South Haven, Mich.

American Optical Company, Safety Division, Southbridge, Mass.

Chicago Eye Shield Company, 2300 Warren Blvd., Chicago, Ill.

Mine Safety Appliances Company, 201 North Braddock Ave., Pittsburgh 8, Pa.

Pulmosan Safety Equipment Corporation, 644 Pacific St., Brookly 17, N. Y.

Ray-O-Vac Company, Willson Products Division, Reading, Pa.

Use and Care of Respiratory Devices

The use of respirators is advised for protection from dusts or mists during field handling of and exposure to insecticides. *Their use is not a substitute for essential precautions.*

It is especially important that respirators be used during the loading of distribution equipment, and when disposing of empty containers. Field operators who may be exposed to small amounts of insecticide, even those not obviously detectable, continuously during the day or for succeeding days should faithfully use respirators.

Respirators will give adequate protection to airplane pilots during normal dusting or spraying operations, but they should wear gas masks when exposed to high concentrations. Pilots should wear goggles that give a tight seal with the respirator around the nosepiece.

The following practices are highly important:

(1) Change filters twice a day, or oftener should breathing become difficult.

(2) Change cartridge after 8 hours of actual use, or oftener if any odor of the insecticide is detected.

(3) Remove filter and cartridge and wash facepiece with soap and warm water after use. Rinse thoroughly to remove all traces of soap. Wipe facepiece with clean cloth uncontaminated with insecticide, and place in a well-ventilated area to dry.

(4) Store respirator, filters, and cartridges in a clean, dry place—preferably in a tightly closed paper or plastic bag.

The respirator should be fitted properly on the face—not too high on the nose, with narrow portion over the bridge of the nose and chin cup contacting under side of the chin. The headband should be adjusted just tightly enough to insure a good seal. Manufacturers can supply special facepieces, if the standard one does not fit.

As mentioned above, respirators do not provide needed protection from inhalation of insecticide dust, mist, and vapors for use by workers formulating or mixing insecticides in closed or inadequately ventilated spaces or applying insecticides, including aerosols, in greenhouses. Full-face gas masks equipped with test canisters should be worn under these conditions. Proper protective clothing should also be worn when applying insecticides in greenhouses or other enclosed spaces. When grain fumigants are applied, recommendations of the manufacturer should be followed closely.

Summary

Methods have been developed to determine the efficiency of gas-mask canisters and respirator filters and cartridges against all the common pesticides. The apparatus and techniques are described.

The acceptable protective units are listed. They are combinations of filters and activated charcoal. Since no effective absorbing agent has been found for the organic phosphorus insecticides, efficient filters are necessary. The activated charcoal usually removes solvent and volatile impurities or odorous ingredients found in technical grades of these insecticides.

The major part of sprays and dusts containing halogenated pesticides will be retained by the filter. Vapors from the particles in the filter and the vapor in the air will be absorbed by the activated charcoal.

Acknowledgment

The authors gratefully acknowledge the interest and helpful suggestions received from H. L. Haller, assistant to the Administrator, Agricultural Research Service.

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Soil and Water Research

Secretary of Agriculture Ezra Taft Benson recently appointed a working group to study facility needs for soil and water conservation research. The study is being made at the request of the Senate Committee on Agricultural Appropriations.

Members of the working group are: Dr. G. M. Browning of Iowa State College, representing the State Agricultural Experiment Stations; Gerald E. Ryerson of the Soil Conservation Service; and Dr. Cecil H. Wadleigh and Dr. Darnell M. Whitt of the Agricultural Research Service.

Secretary Benson directed the working group to focus its attention on problems of national and regional importance, leaving for the attention of the states problems having only state or local significance.

The working group will receive recommendations from Federal, State, and local organizations concerned with the conservation of soil and water resources.. Interested parties are invited to present their evaluation of the kind and extent of soil and water problems needing research. A series of public hearings is planned.

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Kramer On Advertising Staff

Robert J. Kramer has been appointed to the advertising staff of the Velsicol Chemical Corp., Chicago. Mr. Kramer has been with Velsicol since 1952.

Large bald areas in cantaloupe fields were unexplained for many years. Researchers now know nematodes usually are to blame.

by S. H. Benedict
Shell Chemical Company
New York

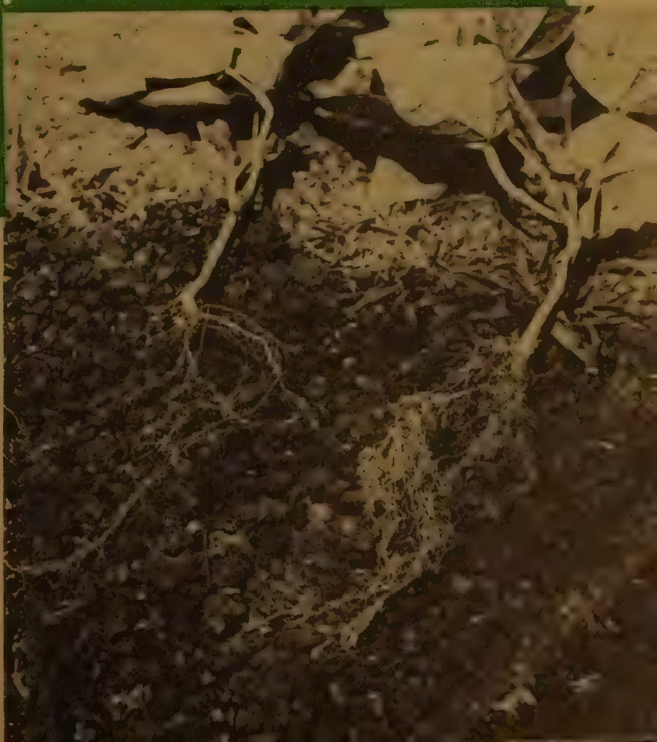
FERTILIZER-NEMATOCIDE MIXTURES Can Be Profitable

ALERT fertilizer manufacturers are seriously eyeing the benefits of offering fertilizer-nemotocide mixtures to farmers. The mixtures have many plus features. Together they indicate higher sales and profit margins for manufacturers than can be obtained with fertilizers alone.

What makes the market for these mixtures look profitable? Nematology research has moved ahead by giant strides in the past few years. Scientists at agricultural colleges plus the work of Shell research men have shown that nematodes are at the root of many serious farm losses.

As nearly everyone knows, nematodes attack plants underground. They suck vital juices from the end cells of root hairs with a long sheath-like tongue. They also form cysts on the roots, causing galls or abnormally thick root sections.

Farmers see the results of a nematode attack when plants lose vitality, yields are lowered, and, in



The bean plant on the left shows the destructive action of nematodes. The root system has been reduced, and many galls have been formed on surviving roots. This check produced a much lower yield than the nematocide treated bean many cases, when plants finally die. Until lately, the large "sick areas" in fields where no crops could grow remained a puzzling mystery. Scientists have often found these areas were infested with nematodes.

As with the control of any pest, nematode control can be costly and cumbersome. It can require extra trips over the field and the use of complicated equipment. That is where mixtures offer a big plus feature for farmers. Mixtures of fertilizer with a nemotocide, make it possible for farmers to apply nemotocide and fertilizer in one operation. Furthermore, they can use equipment they already have on the farm.

Mixing fertilizers and a nemotocide is not a radically new idea. Such mixtures have been used with success by farmers and have been sold with profit by manufacturers. According to Edgar McGrath, manager, Farmers and Planters Fertilizer Company, of Salisbury, Maryland, successful experience with insecticide-fertilizer mixtures led him to add Nemagon* to his fertilizer. How does he sell it?

Edgar McGrath says, "A typical example would be—a bean-grower phones on Wednesday that he'll be ready to plant next Monday. He wants 5-10-10 fertilizer and is going to apply it at the rate of 500 pounds per acre. He tells me to mix the right amount of fumigant with the fertilizer.

"This grower is out to save every possible nickel, and by buying his fumigant mixed with a fertilizer and applying them both at planting time, he makes one trip over the field. What's more, he has the added advantage of having the fumigant right in the row—where it will do the most good."

One thing to watch for when mixing any pest control chemical with fertilizer is its compatibility with a wide variety of crops. Most nematocides have the advantage of compatibility with nearly all kinds of germinating and growing crops. So this unique development puts the fertilizer manufacturer in the role of dispensing this latest scientific development.

Fertilizer manufacturers are offered a granular form of Nemagon in various concentrations from a number of suppliers who obtain the material from the basic manufacturer, the Shell Chemical Corporation. A typical concentration is a 25% formulation. Mixing procedure is standardized and readily available to plant operations. In the case cited by Edgar McGrath, available data would show that 8 pounds actual Nemagon per acre is required to give nematode control. This would mean 140 pounds of 25% Nemagon granules would be incorporated in one ton of fertilizer.

Precautionary safety recommendations should be followed during mixing. But these create no problems. Moreover, the final fertilizer-nematocide product can be stored in standard paper asphalt-lined bags, similar to those used for most fertilizer-insecticide mixtures.

An important consideration is storage time. Even though Nemagon is a fumigant, it can be held in bags ready for delivery for at least ten days, with no appreciable loss. In some cases this can be stretched up to two weeks.

Following his own successful experience in selling fertilizer nematocide mixtures to farmers, Edgar McGrath feels that "alert fertilizer manufacturers will boost sales and their profit margins by offering these mixtures to farmers."

The first step for a manufacturer is to find out the degree of nematode damage in his own area. As a general guide, the main areas of nematode damage today include the East Coast from New York State south through Florida, the Bootheel area of Missouri, the Rio Grande Valley, and the West coast, including Arizona, California, Oregon, and Washington.

The crops attacked by nematodes include brussel sprouts, cabbage, cantaloupes, carrots, cauliflower, celery, cotton, cucumbers, okra, peppers, potatoes, snapbeans, strawberries, sweetpotatoes, and watermelons.★★

The longer, cleaner roots on the right are from a healthy productive cantaloupe plant which has been treated with nematocide. The untreated check at the left shows swollen tubers and galls with corresponding reduction in the water and plant food absorption capability of the roots.

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*Nematocide made by Shell Chemical Corp., New York.

PEST CONTROL

NEW PESTICIDES FOR ORCHARDS

NEW pesticides which look promising in the battle with insect pests in central Washington orchards were discussed by federal and state entomologists and plant pathologists with approximately 1000 orchardists and others interested in the fruit industry during a series of recent tours of the major producing areas in the state.

Three distinct broods of codling moths, as well as stragglers from the first and second, have kept growers searching for materials to check the pest that has developed resistance to several chemicals. Prolonged hot weather has also favored mites which got the jump on many orchardists, building up to alarming proportions before their presence was suspected.

Increased dosages are required of some chemicals that previously had been holding the pests in check with recommended concentrations.

One bit of silver in the cloudy sky was the report that some mite predators are reported to be developing resistance to toxicants commonly used. Some researchers are now making predator counts along with mite counts when a particular spray program is under test.

Dr. Stanley C. Hoyt, who joined the Washington State College Tree Fruit Experiment station staff in Wenatchee following work at the University of California, related that predators were so effective on two test plots, he was unable to obtain results from his trials.

New mixtures of pesticides applied during abnormally hot weather have resulted in foliage and fruit injury, both in experimental and commercial orchards. Heavy fruit drop from the shaded portion of trees was reported from two orchards where one of the most promising of the new materials (Sevin) was used. The fieldman who checked on the difficulty commented that he was unable to determine whether the temperature, humidity, or some other factor was the cause.

DDT and parathion have effectively controlled the Oriental fruit moth, Dr. Marvin H. Brunson, USDA entomologist, formerly stationed in New Jersey, now at Yakima, Wash., reported. Until the arrival of DDT, there was no known chemical means of effectively checking the pest, he added.

Sevin also works well against that moth. Guthion, because of its residual action, is slightly more effective than parathion.

Four materials producing good results against codling moths are Guthion, Sevin, Diazinon and Trithion, according to Fred Dean, USDA entomologist also stationed at Yakima. Very little injury from use of Trithion has been observed in the Yakima area, but some is reported from the Wenatchee sector, he added.

Against European red mites, Aramite is still working, but the dosage must be increased above the 1 pound per 100 gallons of water previously recommended, Mr. Dean continued. Kelthane is one of the most promising materials, killing mites immediately. Tedion also is effective, but because it is slower acting, growers must plan ahead on its use, and apply it before the mites start building up.

Chlorobenzilate is good, particularly on pears where Aramite may cause some injury, according to Mr. Dean. Some injury from use of chlorobenzilate has been reported by apple orchardists, he remarked. Trithion has caused scabby spots on apples and shotholes in the leaves.

Green peach aphids which alternate between potatoes and tree fruits are controlled effectively by Thiodan and Thimet applied before the leaves start to curl, according to Edward W. Anthon, entomologist at the Tree Fruit Experiment station, Wenatchee. Phosdrin is very effective and provides a good clean-up as does Systox, Phosphadrin and a California Spray-Chemical experimental material.

Resistance to some of the chemicals is being displayed by the peach twig boror, he added.

To control lygus bugs and stink bugs, which cause "cat-facing" on peaches, Thiodan and Dieldrin look good, according to Mr. Anthon. When the stink bug feeds on pears, it causes a corky growth inside the fruit undetectable from the exterior. This causes trouble for processors using pears for canned fruit salad.

Dithane, a fungicide, provides good control for the peach silver mite, a microscopic pest that spends most of its life inside peach tree leaves.

Mr. Anthon has tested 13 different materials on aphids.

Control of the rust mite apparently has been achieved with new experimental oils developed by the California Spray-Chemical Corp., according to Dr. Hoyt, but a final report on his findings will not be available until next year.

Of 14 materials tested against apple aphids on young trees, only two looked good: a systemic compound known as 12880, and Sytam, but the latter caused some injury as a foliar spray, and when it is painted on trunks of trees the operator is exposed to undue hazards, Dr. Hoyt declared. He added that foliage injury was offset in his opinion by the long control achieved.

Mixtures of DDT and the new superior oils produced severe injury on Golden Delicious and some other apple varieties, he went on. Summer sprays with Trithion also injured Jonathan, Winesap, Delicious and Golden Delicious apple varieties, he commented.

Outstanding control of pear psylla was obtained with Dieldrin, Toxaphene and Endrin, Everett Burts, junior entomologist at the Tree Fruit Experiment Station, reported. The materials were used at the rate of ½ pint in 100 gallons of water applied at the rate of 800 gallons of spray per acre. Growers must watch out for residue complications if they use the combination of Dieldrin, DDT and Kelthane, he went on, because the federal authorities regard them as chlorinated hydrocarbons. As a consequence, the permissible residue of any one of the three would be .25 ppm divided by three, if the combination were used.

Blister mites on pears are particularly vulnerable before the blossom opens and again at leaf fall, the speaker continued in discussing the life history of the pest in relation to timing sprays for control.

Growers can't afford to ignore the possibility of bullseye rot developing in apple orchards where there is perennial canker, several plant pathologists agreed. The cankers can cause infection any time from the calyx period on.

Captan, Ziram and Maneb were mentioned as effective. Ziram and Maneb are protectants, while Captan depresses the fungus somewhat more. Cyprex is good in the spring, and "It knocked heck out of scab that the other sprays didn't get," Dr. Roderick Sprague, plant pathologist at the Tree Fruit Experiment station commented.

The annual summer orchard tours, sponsored jointly by Washington State College and the Washington State Horticultural association, attract growers from all parts of the West including British Columbia, as well as scientists from other parts of the nation and abroad.

Accident Prevention School for Fertilizer Plant Personnel in Sept.

A school in accident prevention for fertilizer plant personnel in the Midwest is slated for September 10 and 11 at the National Safety Council's headquarters in Chicago.

Cooperating in setting up arrangements for the school are John E. Smith, Spencer Chemical Co., Pittsburgh, Kansas and Glenn Griffin, National Safety Council. The Midwest regional office of the National Plant Food Institute is assisting in the arrangements.

All fertilizer manufacturers doing business in the Middle West will be invited to send supervisory personnel to the school.

The two-day season will cover numerous phases of safe handling of materials, and will deal with safety problems involved in the formulation of fertilizer-insecticide mixtures.

The registration fee will cover instruction materials provided for each registrant, including safety manuals, educational literature, poster and other safety aids.

This school is one of a series of five being set up at various locations throughout the United States. The opening school was held August 14-15 for the Northeastern region at Cornell University, Ithaca, New York, August 14-15. The Southeastern school will be held at Atlanta, Georgia in the Heart of Atlanta Motel on September 4-5, while the Southwestern session and Western School, tentatively have been set for Austin, Texas and San Mateo, California, respectively.

The program for the *Midwestern school* includes the following speakers and their topics:

Wednesday, September 10—8:30 to 9:00 a.m., registration, introductions and purpose of school, George L. Pelton, Vice Chairman, Fertilizer Section, Smith Agricultural Chemical Co., 9:00 to 9:50 a.m., "Fundamentals of Accident Prevention," Dave Arm, National Safety Council; 10:00 to 10:45 a.m., "The Foreman's Safety Job For All Line Management and Supervisory People," John E. Smith, Spencer Chemical Co., and film, entitled, "No One Else Can Do It; 10:45 to 11:30 a.m., "Personal Factors in Safety, Glenn Griffin, National Safety Council; 11:30 a.m., to 12:30 p.m., buffet luncheon; 12:30 to 1:00 p.m., school participation—"Problems We Would Like To Have Solved," John Gallagher, National Safety Council; 1:00 to 2:30 p.m., group problem assignments; 2:30 to 3:30 p.m., "Discovering Accident Hazards," W. C. Creel, Department of Labor, State of North Carolina, and film, entitled, "Pick Your Safety Target;" 3:30 p.m. to ——, summary and discussion of day's work.

Thursday, September 11—8:30 to 9:30 a.m., "Teaching Job Skills—Teaching Safety," Glenn Griffin, and film, entitled, "Teaching Safety On The Job;" 9:30 to 10:30 a.m., "Materials Handling Problems of the Fertilizer Industry," C. Z. Grenley, International Minerals & Chemical Corp.; 10:30 to 11:30 a.m., "Maintaining Good Order For Safety," W. C. Creel, and film, entitled, "Case of the Cluttered Corner;" 11:30 a.m. to 12:30 p.m., buffet luncheon; 12:30 to 1:00

(Continued on Page 109)

SELLING FERTILIZER

by Ralph Everett

Empire Sales Training Center, Inc.
Buffalo, N. Y.

IF you want a career of enjoyment, try selling a mental concept rather than plant food. If you want to earn real returns on your investment of a career in the fertilizer industry, try selling a dream of tomorrow rather than a ton of nitrogen, phosphorus, potash or a mixture of the same. You're not selling fertilizer . . . you're selling ideas and benefits.

This sounds simple and easy but it's one of the most difficult (and frequently ignored) factors in the business of successful selling. Remembering it, and using it at all times can bring rewards far beyond your fondest dreams. Ignoring this fundamental principle can make selling a disgusting and tiresome affair.

A recent editorial in the *Agricultural Chemicals* magazine indicates a leveling off of fertilizer use by farmers. On the other hand, states the editorial, this plateau in fertilizer consumption is a little hard to understand because scientific research indicates that farmers are using less than half as much fertilizer as they should for best economic results. The fertilizer industry is capable of producing substantially more fertilizer than farmers are now using. With the market far from saturated, it should be evident that a change in selling methods is needed if the industry is to grow and prosper. What kind of a change in selling methods? Easy! Sell a plan of fertilization which will fulfill the mental concept every farmer dreams about.

Imagine you are selling foundation garments. Would you tell a lady she is buying so many square inches of cotton, nylon or silk, with so many ounces of metal in the zipper? Not if you want to make a sale! You'd tell your prospective buyer about her dream world of tomorrow that she could expect by wearing the foundation garment. You would sell her the *idea* that even an ordinary cotton dress put on over this thrilling garment would make her glamorous. You'd hint that her women friends would be envious and that male hearts would beat a little faster as she walked down the street. Her husband, too, would find himself looking with renewed interest. Then you'd make a sale! And of course, in order to have this dream world, she'd have to buy this garment from you.

The plant food or fertilizer industry has the scientific tools to help a farmer's dream of high production at low cost come true. Soil testing of considerable accuracy has been available for a long time. Crop production mapping and the needs of various plants in terms of primary and secondary elements have been outlined by many competent agronomists. Even now, work is underway to define in usable terms the needs for minor elements too. Delivery methods and pricing procedures are being revised to make it easy for the farmer to buy. Factory production methods have improved. Why then, isn't the consumption rate of fertilizer increasing substantially each year? I suggest that better selling METHODS are needed.

The recent National Plant Food Institute Survey pinpoints several interesting viewpoints as held by both farmers and fertilizer dealers in regard to the use of fertilizer. The readers of this article have undoubtedly seen the survey results so I'll not go into details here. One important conclusion seems to stand out in this survey:

Education seems to be a key which will open the door to increased fertilizer use. I agree wholeheartedly that greater education is needed to increase the use of fertilizer. I suggest, however, that something else is needed.

This something else, in my book, is inspiration. Inspiration supplied by the plant food salesman, wholesale and retail, showing how farmers' dreams of higher production at lower costs can be achieved. Our educational institutions were never created for the purpose of inspiring people to want to do a better job and have better things in life. Our educational institutions were created to find ways in which research could be used for a better way of life. Our extension agencies were created for the orderly dissemination of such information. Fertilizer manufacturers cannot demand or in any way expect these institutions to do their selling for them.

Your Prospect Makes Two Decisions

FIRST of all, your prospective user makes up his mind that he'd like to have the benefits you are talking about and *secondly,* he decides that your soil fertility program and your fertilizer will get him these benefits. If you and I could have a royalty on all the salesmen who are trying to sell the second decision first, we'd be multi-millionaires by the end of next week.

General Electric makes light bulbs, but they *sell* better eyesight. Simmons manufactures mattresses but they *sell* more restful slumber. Calverts distills whiskey but they *sell* "clear heads." Revlon makes lipstick but they *sell* the thrill of a kiss. Minneapolis-Honeywell makes thermostats but they *sell* playrooms in the basement. Carnation cans milk but they *sell* healthy babies. Cadillac makes automobiles but they *sell* the concept of "Brother, you've *arrived* when you drive one of our automobiles."

You manufacture one thing but you sell another. Pick up any magazine and study the advertisements of successful companies for a few minutes. You'll begin to see this concept of two decisions your prospect makes when he buys.

The fertilizer industry is not a high profit industry. Most fertilizer manufacturers and dealers would agree that top profits are not made on fertilizers until our prospect becomes a customer fully satisfied that the product will increase his production and cut his costs. The way to sell him so he buys volume amounts, time and again, is to make him believe he is buying something besides a bag of fertilizer.

Picture It For Him

DON'T sell your prospect fertilizer. Sell him what your fertilizer will do for him in terms of what he wants out of life. If he wants greater comfort and convenience, then sell it to him in terms of what you can offer that will accomplish these things for him.

If your prospect wants to reduce his risk of doing business, then demonstrate how your soil fertility program can accomplish it for him. If he wants greater pride and prestige in growing outstanding crops, then picture him enjoying this prestige with the use of your fertility program and service. If he wants greater profits at less cost, then let him feel the "crinkle" of the crisp bills he is saving by following your recommendations. Then you'll have a man who will be willing to do something tomorrow he wasn't doing yesterday.

How Effective is Your Selling Plan?

AN explorer was once asked, "Will wild beasts harm you in the jungle if you carry a torch?" "It all depends," he answered, "on how fast you carry it."

In today's fierce, competitive battle, we sometimes have to run fast just to maintain our position. Whether or not you will outrun your competitor depends upon how attractive your selling plan is.

Two important elements must be incorporated in an effective selling plan. These elements are conviction and desire. Conviction and desire are steps taken together or closely together by the prospective customer. Like a well matched team of horses, they often pull neck and neck. Conviction comes chiefly through intellect or reason; desire through aroused motives and emotional appeals. Conviction needs logical evidence. (Our scientific institutions supply this.) Men are convinced that they should think as you think when you present to them definite and logical reasons and evidence. Conviction alone, however, isn't enough. We might show attention and interest in an elephant but we wouldn't want to buy one, because we couldn't see what we could do with the thing. We need additional stimuli supplied by the salesman to help us desire to own what the salesman has to offer.

The writer has just had the experience of helping a highly respected and successful plant food company develop a selling plan. This company had been rendering services far beyond what its competitors were offering, but had never correlated all these services in a plan which could picture for the prospective buyer exactly how much more he would get for his money. The newly developed plan now has conviction and desire built into it and I'll bet my last dollar those plant food salesmen will find their work easier, make more sales with less callbacks, reduce selling costs, and bring lasting benefits to their customers because they have a plan for selling.

If you are handling quality products and rendering what you feel to be adequate service but still are not achieving the sales you would like, try developing a selling plan for your salesmen. It may not be the best plan in the world but you can rest assured that your prospects will feel more inclined to buy with complete confidence when you picture what you can achieve for them with a well thought-out selling plan. Start selling a mental concept with your selling plan and your job will become increasingly pleasant. Forget this fundamental principle and you won't enjoy the sale you'd like to have.★★

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White-Pine Weevil Control

The Northestern Forest Experiment Station, Upper Darby, Pa., has prepared a bulletin on the control of the white-pine weevil with insecticidal emulsions.

The bulletin points out that emulsions have the following advantages; they are easy to prepare and apply, they offer a wide range of materials that are not injurious to the trees, they can be effective against other insects, their cost is relatively low, and it is possible to lengthen their period of effectiveness considerably by the use of an extender.

For use in the Spring, the folder recommends DDT at one per cent; heptachlor at one per cent; heptachlor plus extender, one-half per cent; lindane plus extender, one-quarter per cent; and malathion plus extender one and one-half per cent.

Fall applications in late October, using lindane plus the extender at two, one, and one-half per cent, resulted in only one weeviled leader out of 10,000 trees sprayed. Fall treatments with three to five per cent emulsions of heptachlor, plus the extender, also appeared promising. The station used Aroclor 5460 as the extender in its tests.

PEST CONTROL IN Grain Storage

The following excerpts are from a report based on research conducted by A.C. Apt, J. K. Quinlan, J. H. Schesser, G. H. Spitler, G. D. White, W. K. Whitney, and H. E. Fearing of the Stored-Grain Insects Laboratory, Manhattan, Kans. and published by the USDA, Marketing Research Division, ARS, as Marketing Research Research Report No. 245, in July 1958.

GRAIN handling and grain storage practices have changed during the past few years, and have resulted in the storage of grain for much longer periods of time, sometimes as long as 5 years. Reserve stocks of grain, particularly corn and wheat, have accumulated as a result of increased yields and the price support program. The safe storage of these reserve stocks has necessitated new and improved methods of preventing damage by insect attack. Emphasis is now being placed on preventive rather than curative measures of insect control.

In line with this trend, intensive studies were begun in the fall of 1952 to explore the possibility of applying insecticides directly to stored wheat and shelled corn to prevent the development of insect infestations. The use of insecticides for this purpose poses numerous problems. The fate of the resulting insecticidal residues must be ascertained to determine whether they will be within safe limits for the ulimate consumers of grain products—both human and livestock—and whether the grade of the grain is affected by the treatments.

The studies were conducted under actual storage conditions both on the farm and at CCC bin sites. At the latter tests were made with wheat and shelled corn stored in the standard circular 3,250-bushel metal bins of the Commodity Credit Corporation, U. S. Department of Agriculture, and also on shelled corn 3,000-bushel rectangular wooden bins.

Three formulations of ryania were used in these tests. All were in dust form but no diluent was required since the ground ryania contains approximately 0.25 percent of ryanodine, the active agent and has good dusting properties.

After the dusts were applied, the grain was sampled monthly to determine the insect population trends and the moisture content of the grain. These samples were used to estimate the levels of residue, to observe any change in the potency of the residues in bioassay tests, and to establish commercial grades. In tests with wheat, the level of residue was also traced through the milling process.

Application rates of ryania ranged from 20 to 100 pounds per 1,000 bushels in wheat, and from 20 to 60 pounds in corn. These rates practically eliminated any initial insect populations, and kept the grain almost insect-free for as long as 33 months.

Milling tests showed that 80 to 90 percent of the ryania could be removed in the scouring process preparatory to milling, and that relatively small amounts were carried into the feed and flour fractions.

There was little change in the overall moisture content of the grain during the storage period, and there was no apparent effect on the behavior of the protective dusts attributable to variations in moisture content. There were no changes in the commercial grade of the wheat during the period of test. A large portion of the corn was downgraded because of damage from moisture accumulation in the surface layer during the cooler months of the year. One series treated with the ryania-sulfoxide formulation was downgraded because of odor.

In wheat, 9 species of stored-grain insects were found, the most abundant being the dermestids, the lesser grain borer, the flat grain beetle, and the saw-toothed grain beetle. In corn, 16 species were noted, the most abundant being the dermestids, the lesser grain borer, the flat grain beetle, and the saw-toothed grain beetle. In corn, 16 species were noted, the most abundant being the red flour beetle, the flat grain beetle, the saw-toothed grain beetle, and the Angoumois grain moth.

Findings

The following points were demonstrated in the tests.

1. Ryania formulations protected stored wheat and shelled corn through long periods of storage.

2. Dosage rates of 20 pounds per 1,000 bushels or higher in wheat and in shelled corn provided excellent protection from insect infestation through two full summer seasons after the year in which they were applied.

(Continued on Page 113)

Maine Growers Report Higher Blueberry Yields With Ziram

THIS has been a year of trial for the important practice of dusting blueberries. A late, cold and damp spring hindered the set of the fruit and delayed the early growth of the berries. The weather conditions since then have been perfect for the development of twig and blossom blight and for the red leaf disease. In areas where the diseases have been left to spread unchecked, the crop of berries appears to be considerably less than the large crop of last year and somewhat less than the average crop for the last five years.

In areas where the ziram dusts have been used, the harvest appears to be excellent. The crop in some of the dusted areas may even be larger than last year's harvest on a per acre basis. The only cultural practice involved between the two types of areas is that of dusting—a practice that takes a little time and which can be done for less than $1.50 an acre. That cost would add just a small fraction of a penny to the cost of a pound of blueberries, and even that expense would be many times outweighed under this year's conditions by the resulting increases in the number and in the weight of the berries.

The lowbush blueberry industry in Maine is unique in that about 25,000 acres of land are periodically burned, sometimes dusted and otherwise cared for to produce about three-fourths of all the native wild blueberries harvested in the entire United States. This acreage is about two-thirds of all the wild and cultivated blueberry acreage in this country. Blueberry culture is also unique in that the amount of effort required to produce a crop can be extremely small, in view of the value of the crop. That attitude was more or less the old order of affairs.

As the value of the blueberry crop increased because of expanding markets, and because of new methods of processing and preserving the berries, some growers realized that the profit could be increased greatly by raising more berries and better berries on each acre.

Dusting to control diseases has been a common practice for some 30 years. The types of dust used originally have been replaced to a large extent by more active iron and zinc-based materials that give better control and require fewer pounds per acre. The difference in efficiency of iron and zinc does not seem to be great, but many growers who have used both types prefer the white zinc dusts because they are cleaner to handle than the dark-colored iron compounds.

Twig and blossom blight and the red leaf disease both respond to the zinc or ziram-type dusts as Niacide-Z. Control of the former disease is important because it causes many of the plants to die back and not blossom at all, or the flowers may be blighted and not set any fruit. The red leaf disease is more common. It causes the leaves to wither, and this defoliation reduces the number and the weight of the blueberries. Since berries mean dollars in Maine, growers who concentrate on producing more berries and better berries on limited acreages of land are increasing the profits from their operations. This year has been an outstanding example of what can be done with a limited expenditure of labor and of money.

The set of the fruit was poor in most blueberry areas due to a cold, wet spring, and to the great variation in early temperatures. An excess of moisture during the season has given both the common blueberry diseases an excellent chance to develop. Many growers with large land holdings did not bother to dust on the theory that the poor set of berries indicated a small crop and limited profits at best.

Other growers, particularly in the Waldo and Kennebec county areas, made good use of the ziram dusts. Berry growth has been excellent and the quality of the fruit is above the average.

The actual figures will not be known until the entire blueberry crop is harvested, but growers in southern Maine and in the coastal area near Rockland state that fields treated with the ziram dusts are loaded with berries and that even the plants appear to be darker, sturdier and more healthy than the untreated plants. Growers who made limited use of the zirams report equally limited improvements.

Many agricultural agencies and the blueberry growers themselves are waiting for the final harvest before they commit themselves to expanding programs of blueberry culture in the future. Right now it looks as though this season had been the clincher in the argument that science is able to provide a better environment and better growing conditions even for a crop that has been wild since man first discovered that the delicious blue fruit would follow closely on the heels of any land-clearing fire that devastated a Maine woodland area. The Maine climate can produce the most delicious of all blueberries, but technical advances in the development of iron and ziram dusts to control diseases can make those delicious berries even better.

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Fish and Wildlife Service Comments on Research Program Contemplated in Conjunction With P. L. 85-582

WITH the signing into law of the Magnuson Bill (S. 2447) for studies on effects of pesticides on fish and wildlife, industry is naturally interested in the plans of the Secretary of Interior for conducting these studies. In an interwith with W. W. Dykstra, research staff assistant of the U. S. Fish & Wildlife Service, Washington, D.C., your AGRICULTURAL CHEMICALS reporter discussed some of the questions concerning who will conduct the investigations and along what lines.

Although P.L. 85-582 authorized $280,000 to be appropriated for the study, the Congress actually appropriated $125,000 on Aug. 23. Mr. Dykstra indicated the funds would be used to expand studies the U.S. Fish and Wildlife Service has had underway for several years. These studies have dealt with the effects of DDT and some of the chlorinated hydrocarbons on all forms of animals and fish. The funds just now approved will permit further research along the same lines using some of the newer pesticides, particularly the chemicals now being used in the USDA fire ant program (heptachlor and dieldrin).

The U.S. Fish and Wildlife Service also plans research in cooperation with entomologists and pesticide manufacturers leading to the development of formulations, application techniques, rates and times of applications which will permit mass application to control economic pests, but with a minimum hazard to fish and wildlife. Some of this expanded investigation will include studies on aerial application to large fields, with references, of course, to how the pesticides reach and affect fish and wildlife.

Mr. Dykstra indicated that more information is desired on how wildlife comes in contact with pesticides, and more investigation is needed on how pesticides affect the reproductive capacity of animals. Both projects will be included in the expanded research program.

Previous studies of the Fish and Wildlife Service have been conducted under the direction of Dr. James DeWitt, biochemist at the Patuxent Wildlife Research Refuge in Laurel, Md., and Dr. Oliver B. Cope, fishery biologist at Logan, Utah. The wildlife investigations in the east will continue under Dr. DeWitt's supervision. Studies will be conducted in the Laurel Laboratories and in the Wildlife Research Laboratories in Denver, Colo. where the work will be under the direction of D. G. Crabtree. Dr. Cope will direct the fishery research activities. In addition to laboratory investigations, expanded field studies for both fish and wildlife are still another phase of the proposed projects.

Eradication Program Lauded

A. L. MILLER, representative from Nebraska in the U. S. House of Representatives, in an address in the House, August 14, directed attention to the extremely important role that pesticides play in protecting the Nation's food supply and the public health. If pesticides were not used, he asserted, "I doubt if it would be possible to produce apples, peaches, potatoes, citrus, and tomatoes, and many other crops would be drastically reduced."

The Miller Amendment, its coauthor believes, "gives to the Food and Drug Administration sufficient authority to assure the public that they are adequately protected against the hazard of the use of (pesticides) in food production." He noted that the "fire ant eradication program in the South is the latest target for the food faddists," but offered evidence to contradict the report that pest control problems are seriously damaging wildlife.

In summation, he counseled: "I sincerely urge that we should act slowly before we do anything drastic to curtail these eradication programs."

Public Law 85-582
85th Congress, S. 2447
August 1, 1958

To authorize and direct the Secretary of the Interior to undertake continuing studies of the effects of insecticides, herbicides, fungicides and other pesticides, upon fish and wildlife for the purpose of preventing losses of those invaluable natural resources following application of these materials and to provide basic data on the various chemical controls so that forests, croplands, wetlands, rangelands and other lands can be sprayed with minimum losses of fish and wildlife.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is authorized and directed to undertake comprehensive continuing studies on the effects of insecticides, herbicides, fungicides and pesticides, upon the fish and wildlife resources of the United States, for the purpose of determining the amounts, percentages, and formulations of such chemicals that are lethal to or injurious to fish and wildlife and the amounts, percentages, mixtures, or formulations that can be used safely, and thereby prevent losses of fish and wildlife from such spraying, dusting, or other treatment.

SEC. 2. The sum of $280,000 per anum is hereby authorized to be appropriated to carry out the objectives of this Act.

Approved August 1, 1958.

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- Tractor-Trailer Type Rigs For Ground Spraying ►
- Transland Ag-2
- European Agricultural Aviation Center
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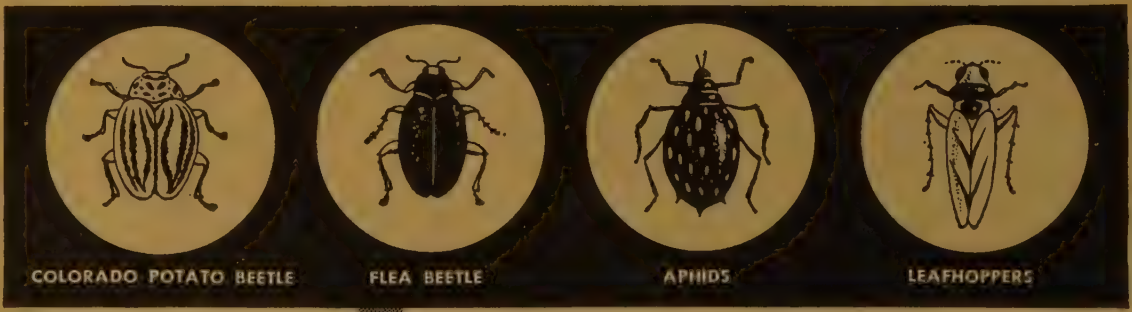

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FLYING FARMERS

. . . 800 Attend 13th Meeting

ALMOST 800 air-minded farmers flew 300 airplanes into New York last month for the 13th annual convention of the National Flying Farmers Association, August 11 to 14. The planes, mostly Pipers and Cessnas, were flown into Teterboro Airport at nearby Teterboro, New Jersey, and contributed to the largest traffic volume in that airport's history.

The Flying Farmers Association maintains national headquarters at Wichita, Kansas, and is composed of more than 5,000 members who are engaged in every phase of agriculture and who fly their own airplanes in the pursuit of agriculture and ranching—and for pleasure. The Association has chapters in 37 states and in three Canadian provinces. The members own over 3200 planes. About 80 per cent of NFFA members do their own piloting and own their own landing strips. The group is a family organization in which the plane is considered as another family car. The members buy almost 10 per cent of all personal planes produced.

A small portion of the group's membership does its own aerial application of agricultural chemicals, but the large majority, almost 90 per cent, prefer to leave agricultural aviation to the professionals. Because their planes are family-type planes, they are not equipped to carry dispensing equipment. In addition, as pilots, the members fully appreciate the special skills required of a successful aerial applicating pilot.

To be eligible for membership in the Flying Farmers Association, a person must make the major portion of his living through farming. A professional agricultural aviator would not be eligible under these rules, but he could join as an associate member. Some members, of course, are farmers and do commercial aerial spraying in addition.

G. R. Jones, a rice, oats, and soy bean farmer in Almyra, Ark., falls in the latter category. Farmer Jones, as he is known, also is president of Flying Farmers, Inc., in Stuttgart, Ark. With his son-in-law, Jimmy Oliver, Farmer Jones operates a Cessna aircraft agency and does contract seeding, fertilizing, dusting, and spraying. Interviewed at the Flying Farmers Convention, Farmer Jones said that virtually all of the fertilization of rice in his area is carried out by aircraft. Seventy per cent of the rice is planted by aircraft and at least 60 per cent of the insecticides used are applied from the air. Stuttgart is known as the rice and duck capital of the U.S., according to Farmer Jones.

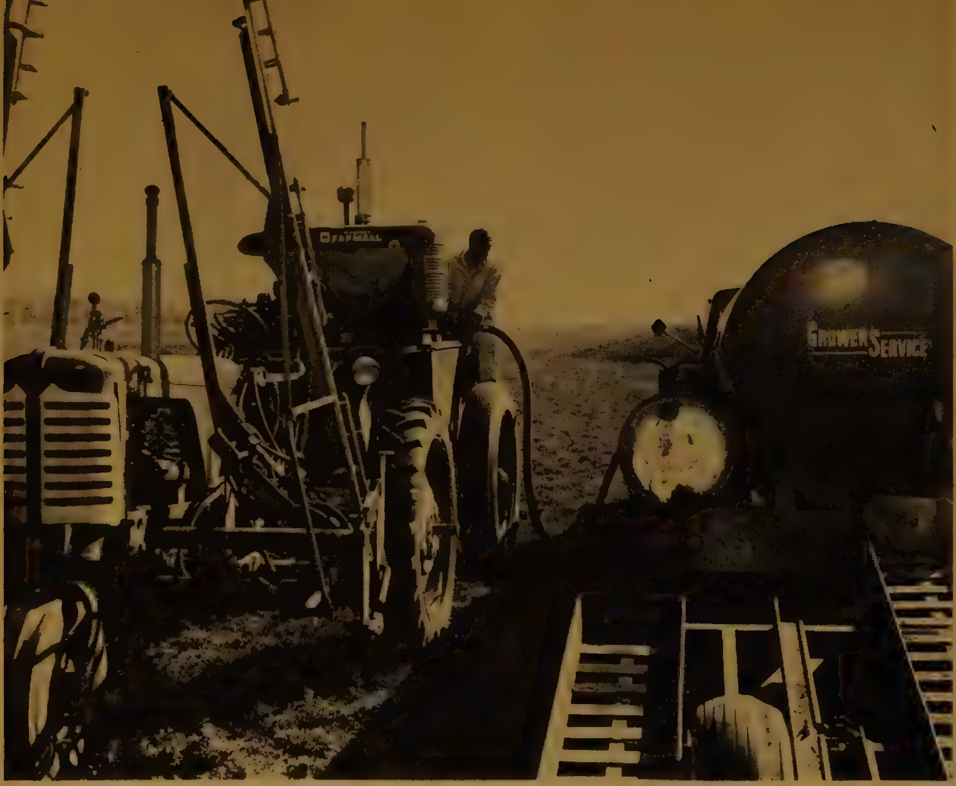
For his spraying operations, Farmer Jones uses two Stearmans and three Cessna L-19's. The Cessnas are converted army planes. The army recently released five of its L-19's for agricultural experimental work and Farmer Jones has three of them.

In addition to aerial spraying, his planes are valuable for use in inspecting rice levees which must be checked periodically.

More than 100 uses have been found for airplanes on farms and ranches, according to Kenneth C. Butler of Hutchinson, Minn., president of the National Flying Farmers Association. Mr. Butler said that they are used for jobs ranging from checking fences to delivering produce. In New Mexico, he said, the state hires pilots to hunt eagles and coyotes. And traces of erosion, he observed, can be seen from the air much sooner than they are noticed on the ground.

Although the Flying Farmers do not do their own aerial application as a rule, they have exhibited a strong interest in agricultural aviation. In 1949, the NFFA initiated a project for development of an experimental plane especially designed for dusting, spraying, seeding, and fertilizing. Designated the Ag-1, the airplane was designed and constructed by the Personal Aircraft Research Center of Texas A. and M. College. Since then, the Ag-2 and Ag-3 have been developed by Texas A. and M. The Ag-2 recently received certification from the Civil Aeronautics Authority and is being manufactured by the Transland Aircraft Co., Torrance, Calif. It uses substantially the same structure as the original Ag-1, but incorporates a 450 h.p. engine and carries 2,000 pounds, as compared with 1,200 for the Ag-1.

The Ag-3 is designed to carry a load of 300 pounds with a 135 h.p. engine. The Piper Aircraft Corp., Lock Haven, Pa., is assisting in the Ag-3 project.



The trailer is loaded from the tank truck which also tows the equipment from field to field. Motor on trailer provides power for spray pump and for mechanical agitator.

Tractor-Trailer Type Rigs For Ground Spraying

by Jack A. Nelson

Manager, Salinas Valley Division
United-Heckathorn Co.

WESTERN agriculture, with its diversity of crops, insects, and weeds, is a challenge to the applicator of agricultural pesticides. Nearly every commercially grown fruit and vegetable crop in the West requires some treatment for the control of pests. Ground spraying is, of course, one of the most important and widely used methods of application.

The types of equipment and spray techniques are as varied as the pest control problems. We, at the Salinas Valley Division of the United-Heckathorn Co. of Richmond, Calif., are concerned with sprays ranging in volume from ten gallons to several hundreds of gallons per acre. We also are concerned with a wide range of spray pressures, depending upon the specific problem or pest involved. It is therefore understandable that ground spraying equipment must be extremely flexible in design and construction.

Most commercial ground spray applicators concerned with operations in the production of vegetable crops and weed control use the "tractor-trailer" type unit, the tractor providing the mobility and the trailer containing the power sprayer. Both tractor and trailer are constructed with adjustable width axles for spraying crops with different row spacings.

Generally, the tractor part of this spray unit contains the spray boom, and mounted within easy reach of the driver, the quick opening shut-off valve and pressure gauge. The spray boom normally is designed to spray eight 40 inch beds per swath. The nozzles mounted on the boom are adjustable for directing the spray for overall coverage, or may be adjusted to spray just the plant row.

In many cases, the spray boom is a three-section boom mounted on the same type hinged brackets used in mounting a cultivating tool bar. In this case, the center section of the spray boom is under the belly of the tractor and far forward enough so that the operator will have good visibility from the tractor seat. With proper linkage and hydraulic ram for each section of the boom, the operator may raise or lower the boom as a whole or elevate to the perpendicular either or both the right or left end sections of the boom without leaving the tractor seat.

For versatility and flexibility of operation, a "goose neck" drawbar for the trailer is an innovation of great merit where short turning radius is the rule rather than the exception. The goose neck designed drawbar is fashioned so that in short turns the rear wheel of the tractor passes under the curved neck of the trailer drawbar.

The spray trailer, itself, consists of a square or rectangular tank, generally 300-500 gallon capacity with a cylindrical or "V" bottom. This type bottom increases the efficiency of the mechanical and/or hydraulic agitation necessary for proper mixing of the chemical.

Hydraulic agitation is accomplished by merely by-passing or returning part or all of the liquid from the pump discharge. Hydraulic agitation alone is not adequate for the proper mixing of some wettable materials, and oil sprays and mechanical agitation must be employed.

The mechanical agitation is accomplished by mounting a steel shaft equipped with from two to four paddles inside and close to the bottom of the tank. Power to turn the agitator shaft is supplied from the same engine used to run the spray pump. Transmission of this power from the motor to the shaft is done with the use of either V-belt and pulley or chain and sprocket drive.

A reciprocating type pump designed for working pressures up to 1000 pounds per square inch, with capacity in volume from 10 to 55 gallons per minute, usually is mounted on top of the spray tank. Other than in orchard spraying, there is very little need for pressures over 400 psi. The result of excessive pressure, an over atomization of the spray, presents increased danger to the operator from additional drift of toxic chemicals. The power to operate the pump is derived from either an air or water cooled gasoline engine with from five to 30 horsepower, depending upon the size of the spray pump.

Techniques used in ground spraying are varied. The basic principle, however, is to put the proper dosage and volume of chemical where it will do the most good. A volume of 25 to 50 gallons per acre with pressures of 150 to 250 psi generally is used in most insecticide spray applications.

Under certain circumstances, it is necessary to increase the volume to 150 to 300 gallons per acre to cover plant surfaces effectively and deposit the chemicals properly. This is particularly true in fungicidal work on large plants.

Probably the most exacting application in ground spraying is in selective weed control, using petroleum solvents on "fern leaf" crops, such as carrots, and dinitro formulations on onions and some legumes. In addition to proper dosage, volume, nozzle size, and pressure, the applicator must concern himself with having adequate soil moisture, spraying the weeds when they are small, rainfall that may follow, temperature, wind velocity, and relative humidity.

In the application of 2,4-D weed killers, the main points to consider, besides carefully following the manufacturers' recommendations, are selection of proper formulations and dosages and the avoidance of drift toward adjacent areas.

Because of potential hazards of 2,4-D residues left in the tank, pump, packing, nozzles, and other parts of a sprayer, it is advisable to have a separate sprayer for 2,4-D work. Most applicators will not use 2,4-D in sprayers used for spraying susceptible crops. Even after thorough cleaning, harmful residues are still possible.

The best possible coverage of the plant is essential in the application of insecticides and fungicides. With the advent of organic phosphate insecticides, many applicators have become somewhat lax in proper techniques of application. It is true that in using phosphates excellent insect control can sometimes be obtained with less than optimum application. Some very inadequate results, however, have been traced to poor application techniques.

Successful ground spraying of row crops calls for the very best equipment and techniques possible. It is this writer's opinion that insufficient volume of spray

(*Continued on Page* 101)

The spray boom normally is designed to spray eight 40-inch beds per swath. The nozzles are adjustable. The forward position of the boom provides the operator with good visibility of the spray pattern.

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AERIAL AGRICULTURE

—an accepted tool of the farmer, forester, etc.

FRED STANNARD JR., a staff reporter of *The Wall Street Journal*, prepared a report on aerial crop dusters for the August 5 issue of that newspaper which classified the airplane as an accepted tool of the farmer, forester, and public health official.

Within the past year, the report pointed out, aerial applicators have sprayed to control boll weevils, fire ants, Mediterranean fruit flies, Japanese beetles, grasshoppers, and mosquitoes. In forests, the airplane has been used against the spruce budworm and the gypsy moth. Airplanes also have been used to seed rangeland and woodlands.

The National Aviation Trades Association is reported as having predicted a record $107 million expenditure for the treatment of approximately 60 million acres this year. This acreage total would be an 11 per cent gain over last year.

Already in 1958, the U. S. Forest service has sprayed 1,120,000 acres of forest land in fighting the spruce budworm. Earlier this year 300,000 acres were treated in Maine and in July aerial applicators completed a 820,000 acre project in eastern Oregon. Last year 750,000 acres of forests in Montana were sprayed with DDT.

In its campaign against agricultural pests, the U. S. Department of Agriculture spent a record $5,329,949 last year, most of it in Florida to control the Mediterranean fruit fly. This year's biggest projects are listed as the grasshopper infestation in Colorado, Kansas, New Mexico, Oklahoma, and Texas, and the fire ant in the South. Total dollar outlays this year will be about $2.6 million.

Dr. S. W. Simmons, chief of the technology branch of the Public Health Service in Atlanta, is quoted as saying that aerial spraying for health purposes is on the increase in the West because of the big increase in irrigated land that breeds mosquitoes, and in the East because of the industrialization of marsh lands. In California, Florida, and New Jersey, health authorities use aircraft to spray mosquito-infested areas and one Texas community maintains its own plane for use in controlling insects. By far the largest crop duster use, however, is in agriculture and forestry projects.

The article points out that most of the large agricultural chemical manufacturers supply basic ingredients for both ground and aerial application. Because these firms cannot trace their output to its end use they are unable to tell just how much actually is used aerially, but they believe it is gaining. Port Fertilizer & Chemical Co. of Los Fresnos, Tex., maker of insecticides, fungicides, and fertilizers, reports its sales for aerial application have increased each year since 1936. One company official told *The Wall Street Journal* that aerial application will continue to grow in all phases of agricultural use, due, in particular, to the steady growth in the size of farm units. The larger the farm, the more practical is the application by air.

Although DDT and 2-4,D are the most commonly used pesticides, chemical companies and formulators have been developing many specialized poisons. Monsanto has Niran for orchard pests and, last spring, Union Carbide introduced Sevin. Naugatuck is experimenting with a dust formulation of Phygon and 2,4-D for application to rice to kill weeds and at the same time prevent algae from forming in the water. Also in the experimental stage is a maleic hydrazide aerial spray for potato fields to prevent sprouting.

Five years ago there were 2,000 aerial spray operators with 7,500 pilots spraying 40 million acres. Last year 1,800 operators with 4,000 pilots sprayed 54 million acres. A crop duster may be a pilot who owns one plane in which he gives private flying lessons on weekends and sprays crop land whenever he lands a job. Or he may be "professional" with a fleet of crop dusting planes, a shop, a full time mechanic, and an entomologist. In Missouri, for instance, of the 61 firms registered within the state as crop dusters, 26 have more than one airplane.

Listed as a typical "professional" crop dusting operator was Mid-Continent Sprayers of Hayti, Mo. Mid-Continent has eight Stearman aircraft. Five years ago the company had only three Stearmans. With its current fleet, business has more than doubled. Another crop dusting firm, Mercedes Dusting Service, Inc., Mercedes, Texas, operates eight Stearmans and two Piper aircraft, and reports a 25 per cent increase in business in the past five years.

L. P. Nolen, a partner in the firm, told the *Journal* that the future of aerial application is good because better chemicals are being developed to do more farm jobs

(*Continued on page* 111)

Aviation Operators Listing

A directory of 2,377 agricultural and industrial aviation operators has been published by the National Aviation Trades Association.

The new listing supplies the names, addresses, and work activities of those operators who responded to the 1957 annual survey of aerial work. The last such directory was published by the Civil Aeronautics Administration in 1954.

Copies are available from the NATA at 1346 Connecticut Avenue, N.W., Washington 6, D.C., for $7.50.

European Agricultural Group Formed

THE Organization for European Economic Co-operation, an international body in which European Governments work together from headquarters in Paris, has formed the European Agricultural Aviation Center.

The original mission of the Center will be to promote the development of agricultural aviation in Europe. This will be done by giving advice and information, by bringing those who are concerned with agricultural aviation in the different European countries into contact with each other, and by promoting scientific research in this field.

In addition, the E.A.A.C. will keep itself informed on the progress made with aircraft in agriculture and forestry in other parts of the world. The group plans to pay special attention to work done in countries such as the U.S., Canada, and New Zealand, where agricultural aviation has reached a high stage of development.

Other information of value to European crop dusters will be obtained by the Center from manufacturers of aircraft and other apparatus for aerial application. Manufacturers of agricultural chemicals also have been requested to provide the group regularly with information on their products.

Information of importance will be published in a periodic bulletin and disseminated to all operators, government services, and research institutions for agricultural aviation in the member countries.

Denmark, France, West Germany, Italy, Netherlands, Spain, Sweden, and Great Britan have joined the E.A.A.C. and others are expected to follow. The headquarters of the Center will be located at The Hague, Netherlands. Dr. W. J. Hann, a Netherlands agricultural aviation authority, is manager of the new organization.

During the past 12 years, Dr. Mann has done scientific and organization work for agricultural aviation purposes. In 1952 he visited the U.S. as secretary of a technical assistance mission. The report of this mission is a well-known booklet, "The use of aircraft in agriculture in the U.S.A."

The address of the European Agricultural Aviation Center is 12. v.d. Boschstraat 4, The Hague, Netherlands.

Ag-2 Receives Certification

Type Certificate No.4820 has been awarded by the civil Aeronatics Administration to the Ag-2 Farm and Forest airplane. Designed and manufactured by the Transland Division of the Hi-Shear Rivet Tool Co., Torrance, Calif., the Ag-2 now is available for agricultural and forestry service througout the world.

The airplane, an all-metal, low-wing monoplane, is powered by a 600 HP R-1340 engine. Flight tests have proven its ability to operate under adverse conditions such as extremes of temperature, short runways or high obstructions. Actual applicating and fire fighting tests have been conducted successfully.

The Ag-2 has a complete and separate system for dispensing solids and another for liquids. Both systems can be controled singly or simultaneously by the pilot in flight. A 53 cubic foot hopper will hold 2,000 pounds of low-density solids and up to 3,000 pounds of higher specific gravity materials and is an integral part of the fuselage — located between the engine firewall and the cockpit. Four separate sprays tanks and two fuel cells are located in the wings.

A high reserve engine power, combined with excellent airplane maneuverability, is said to produce maximum safety on all operations. The Ag-2 will fly at 80 mph with a full load and flaps down, using less that 50 per cent engine power.

It is expected that the Ag-2 will be produced in several versions — two place, single place, open cockpit, and closed cockpit. Transland expects to market the plane in all countries and climates.

PEST ROUNDUP

By Kelvin Dorward

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

Pink Bollworm Again Found in Maricopa County, Arizona

DURING the first week of July 1958 a heavy infestation of the pink bollworm was reported in several cotton fields near Gila Bend, Maricopa County, Arizona. As of August 1, the known infested area approximated 7,000 acres. Following the initial find, plans were promptly formulated to inaugurate an eradication program. Cooperating in this effort are the Plant Pest Control Division, USDA, the State Commission of Agriculture and Horticulture, the Cotton Producers Association, and the cotton industry, primarily ginning and oil mill interests. The eradication plan during the 1958 season calls for application of an effective insecticide at the rate of 2 pounds technical per acre at weekly intervals for the period when the bolls are susceptible to pink bollworm attack. The land will be cleared completely of stalks, stalks and boll residues destroyed, no volunteer cotton grown in 1959 and cotton planted in a designated period. Adequate insecticide will be applied during the susceptible period in 1959 together with other precautions that may be deemed advisable. (Note: an extension of the area was reported August 7 with the finding of an infested field in the main plantings of cotton in the Buckeye section of Maricopa County. This field is on the outer periphery of a block of a little over 20,000 acres of cotton.)

PEST ROUNDUP SUMMARY

- ★ **Bollworm eradication program under way in Arizona**
- ★ **Cotton pests heavy in sections of North and South Carolina, Texas, Alabama and New Mexico**
- ★ **First report of European Corn Borer found in cotton stalks in Alabama**
- ★ **Grasshoppers still a damaging factor in some areas— large scale control program over rangeland was about completed by late July.**

Cotton Bollworm Serious Some Areas

THE bollworm by late July was causing more concern than any other cotton insect in several areas. This insect caused heavy damage to several fields in Scotland and Anson Counties of North Carolina, while in South Carolina it was regarded as the number-one cotton pest in most of the state. In South Carolina, damage was statewide, with 35-50 percent of squares and young bolls being damaged in fields where controls were not applied at three-day intervals. The infestation in Georgia was considered to be the worst on record for that state. In fields checked in middle and southern areas during the last week of July, eggs averaged 15 and larvae 8 per 100 terminals.

Bollworm counts in Alabama remained fairly constant, with slightly lighter populations in the northern part of the state. Mississippi recorded some square injury but no general egg deposition was reported from the delta section. Predator control was important in Tennessee, but bollworm populations were heavier in fields treated for boll weevil when insecticides were not added for bollworms. Light populations of the bollworm were reported from Louisiana, Arkansas, Missouri and Oklahoma, but they constituted the principal problem in Texas cotton, particularly in the central, north central, east and northeastern areas. In New Mexico, the pest was spotted and on the increase in Arizona, with treatments being applied in some fields.

The boll weevil which had been relatively light through most of the season was by the end of July showing signs of a build up in some areas. Activity was on the increase in Texas with heavy damage noted in some untreated fields. An increase was reported from older cotton of Louisiana, with light first-brood populations appearing in late-planted cotton. Counts were fairly light in Missouri, Arkansas and Mississippi. A noticeable increase was reported from Alabama, with a serious problem expected if the favorable weather continued. Square infestation in the middle and southern areas of Georgia averaged 35 percent, with a noticeable increase of first generation being reported from south Georgia.

Boll weevils were increasing rapidly in South Carolina by late July. First-generation weevils were ovipositing freely, with square infestations as high as 75 percent in the Florence area. However, where proper controls were applied in the Darlington area, the infestation was held to less than one percent in 82 fields checked. In scattered locations in the same area, infestations up to 18 percent were found, with counts going up to 70 percent in untreated fields of some counties. Although high populations of weevil were reported from some North Carolina fields, the build-up was slow in the lower Piedmont area.

Aphids on cotton were rather light in most states. Damaging numbers were building up in some Georgia fields and treatments were needed in some delta area fields of Mississippi. Populations were on the increase in Arkansas, Tennessee and South Carolina where aphicides were not included with insecticide applications.

Spider mites during the latter part of July were heavy in localized areas of all states from Texas east and lygus bugs were on the increase in parts of New Mexico and Arizona.

An interesting note regarding cotton pests was the first report of the European corn borer being found in cotton stalks in Alabama. This had been reported from Arkansas earlier in the season and from Missouri and Tennessee in past seasons. Little, if any, economic damage has been noted from this pest in cotton.

Cereal and Forage Insects

THE large-scale cooperative rangeland, idleland and roadside grasshopper control programs were virtually over by the latter part of July, but the insects were continuing to cause concern in other areas. The cooperative programs were conducted in 10 states and approximately 4,500,000 acres were treated. The largest acreage was in Colorado where over 2,600,000 acres were treated. Texas with over 775,000 acres; Oklahoma 279,000; Kansas 210,000; Wyoming 195,000; New Mexico 148,000 and Arizona 138,000 accounted for the largest percent of the remaining acreage treated under the Federal-State-land owner cooperative program.

In late July, Alabama and Arkansas reported localized grasshopper problems. Nebraska, North and South Dakota, New Mexico, Utah and California also reported damaging populations continuing into late July. Higher populations than in 1957 were recorded in eastern and northeastern Oklahoma, with second generation *Melanoplus* spp. being observed in some localities.

The fall armyworm by late July was heavy in areas of Delaware, Maryland, Virginia, Tennessee, Louisiana and Arkansas. The true armyworm which failed to reach the serious potentials indicated early in the season was numerous, however, in widely scattered areas. New Jersey reported the pest as being present in considerable numbers, and localized areas in Pennsylvania recorded damage. Both North and South Dakota had scattered armyworm damage, while in Illinois, and Wisconsin predators and parasites were instrumental in reducing populations.

Other cereal and forage insects active in late July include lygus bugs in Oregon, New Mexico, Utah, Colorado and Delaware, and pea aphids in Maryland, Minnesota, Colorado, Utah and Idaho. The spotted alfalfa aphid has not caused concern this season but was on the increase in areas of New Mexico, Colorado and Oklahoma by late July.

Miscellaneous Insect Activity

ORCHARD mites were among the most troublesome fruit pests during late July. These pests were numerous in areas of Maryland, New York, New Jersey, Ohio, Indiana and New Mexico. Aphids were a problem in some Massachusetts orchards and were building up in New York. These insects were heavy in Maryland but parasites were very effective. The pear psylla was more abundant than usual in the Willamette Valley of Oregon and reports indicate control has been more difficult than in the past. At Wenatchee, Washington adults of the third generation were at the peak by the last of July.

Truck crop insects in general were not causing much trouble through July. The beet armyworm was medium on tomatoes in localized areas of California and heavy on sugar beets in areas of Colusa and Sacramento Counties. The Mexican bean beetle was reported as heavy in parts of Utah, Colorado, Alabama and Delaware and the Colorado potato beetle caused damage in Washington and Delaware.

Among the man and animal insects, mosquitoes were causing concern in Idaho, California, Utah, Missouri, Georgia and Delaware. Horse flies were a statewide problem in Virginia and fleas in the homes were on the increase in many states.★★

A reminder that the place for the National Agricultural Chemicals Association 25th annual convention has been changed to the Hotel General Oglethorpe, Savannah, Ga., Oct, 29-31.

LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Effect of Some Pesticides on the Chemical Composition of Apple Leaves

M. T. HILBORN and L. W. Boulanger, of the Maine Agricultural Experiment Station, and G. P. Cooper, of the University of Maine, report* results of a spectographic analysis of McIntosh apple leaves sprayed with various pesticides. The analysis was part of studies on the control of insects and diseases obtained with chemicals, and on possible physiological effects produced by the chemicals, singly or in various combinations, on apple trees.

Under certain conditions, injury to apple leaves or fruit may be caused even by materials recommended in spray programs. The authors mention, as a well-known example, the glyodin-lead arsenate combination, which usually gives good disease and insect control with minimum injury but results in foliage burning and fruit russetting in hot dry summers.

The authors cite reports by other workers who showed that 2-heptadecylglyoxalidine arsenate and arsenic acid, both of which are toxic to apple leaves, were formed when glyodin (2-heptadecylglyoxalidine acetate) and lead arsenate were combined, and that this reaction was prevented by the addition of ferric sulfate, which could therefore be used as a corrective. Another iron compound, ferbam (ferric dimethyldithiocarbamate), was also found to prevent injury when added to the glyodine-lead arsenate mixture.

The spectographic analysis produced further evidence as to the chemical effects on sprayed apple leaves. Various spray treatments were applied in 1957 to randomized single-tree plots, two plots per treatment, in a block of 17-year-old Rogers McIntosh apple trees. The trees grew well during the season and produced good crops without disease or insect injury. Late in August, 100 leaves from the two trees in each treatment were collected and analyzed.

Results are shown in Table 1. Comparison with the unsprayed controls shows that amounts of the various chemical elements present in the leaves were affected differently by the different sprays.

It is known that for good growth, the iron-manganese ratio in plants should be close to 2:1. Table 3 gives the iron-maganese ratios calculated for the various treatments. The ratios resulting from the glyodin plus lead aresenate and from the lead arsenate treatments approach a toxic level. Condition of the foliage on trees in these plots was not as good as in other plots.

The authors suggest that, besides the formation of arsenic acid and 2-heptadecylglyoxalidine arsenate, a decrease in the iron-manganese ratio in apple leaves may also contribute to the spray injury caused by the glyodin-lead arsenate mixture. The possibility that the effectiveness of the two iron compounds, ferric sulfate and ferbam, in correcting the toxicity may be due to the absorption of iron by the leaves and the consequent increase in the iron-manganese ratio is being investigated.

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*M. T. Hilborn, L. W. Boulanger, and G. R. Cooper, "The effect of some pesticides on the chemical composition of McIntosh apple leaves," *Plant Disease Reporter*, vol. 42, no. 6, pages 776-777, June 15, 1958.

Effects of Adding Streptomycin Sulfate to Different Seed Potato Disinfectants for Control of Bacterial Ring Rot

REINER BONDE and Barbara Johnson, of the Maine Agricultural Experiment Station, report* results of field experiments evaluating the efficiency of various materials and combinations for reducing the spread of potato ring rot (caused by the bacterium *Corynebacterium sepedonicum*) during preparation of the seed tubers before planting.

The diseased parts of infected tubers used as the source of inoculum were thoroughly macerated and added to sterilized rain water to form a thick slurry. Freshly cut healthy seed tubers, Katahdin or Green Mountain, were dipped into the inoculum, drained of excessive moisture, and soaked for various periods in solutions of the materials being tested. After treatment the seed pieces were planted in the field immediately.

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*Reiner Bonde and Barbara Johnson, "Studies on the additive effect of streptomycin sulfate on different seed potato disinfectants for the control of bacterial ring rot," *Plant Disease Reporter*, vol. 42, no. 6, pages 781-784, June 15, 1958.

HERCULES RESEARCH—
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From the Hercules Research Center and Agricultural Chemicals Laboratories come an ever increasing number of products that contribute to more productive farming and increased comfort for leisure hours. Here are the established members of the Hercules family: *Toxaphene agricultural insecticide; Thanite® for oil base and aerosol insecticides; Delnav* phosphate pesticide; meta Delphene® insect repellent; Delrad® algicide.*

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TABLE 1

Some chemical constituents of McIntosh apple leaves sprayed with various pesticides. Values in percent of dry weight determined spectrographically

	Treatment							
Element	Captan	Captan + lead arsenate	Glyodin	Glyodin + lead arsenate	Sulfur	Sulfur + lead arsenate	Lead arsenate	Control
Nitrogen	2.55	2.42	2.60	2.37	2.51	2.38	2.36	2.44
Phosphorous	.10	.13	.11	.10	.14	.11	.15	.10
Potassium	1.10	1.15	1.55	1.08	1.10	1.15	1.60	1.09
Copper	.0013	.0013	.0018	.0012	.0017	.0012	.0013	.0012
Iron	.0128	.0120	.0119	.0096	.0093	.0092	.0110	.0110
Magnesium	.40	.40	.31	.34	.41	.36	.33	.35
Manganese	.0072	.0081	.0070	.0082	.0062	.0062	.0092	.0084
Calcium	1.12	1.45	1.39	1.70	2.20	1.14	1.80	1.75
Boron	.0027	.0030	.0031	.0025	.0026	.0024	.0026	.0034

During the growing season plants were examined for foliage symptoms. After harvest, tubers from plants that had not shown symptoms were cut and examined for ring rot.

Preliminary Tests: Of several antibiotics evaluated a number delayed or reduced the amount of infection. Polymyxin (100 to 200 ppm) retarded appearance of symptoms but did not reduce the amount of infection finally present. On the other hand, the percentage of infected plants was reduced from 85 to 95 in untreated controls to 40, 35, 12, and 8, respectively, and Aureomycin (chlortetracycline), Terramycin (oxtetracycline) dihydrostreptomycin sulfate, and streptomycin sulfate, all at 100 ppm.

Although streptomycin sulfate was most effective of the tested materials, it did not give sufficient control of ring rot to be recommended for general use as a speed-potato treatment in Maine.

Effect of adding Streptomycin Sulfate to Disinfectant Solutions: The possibility of obtaining better control from a combination of streptomycin sulfate with other materials was investigated. Two solutions, one containing 100 ppm streptomycin sulfate and the other without streptomycin sulfate, were

(*Continued on Page* 113)

TABLE 3

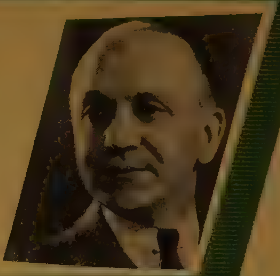
Percentage ring-rot infection from inoculated potato seed pieces treated with different disinfectants with and without streptomycin sulfate in treating solution

Treating material	Concentration	Percentage of plants infected[a]	
		With streptomycin	Without streptomycin
Acti-dione (cycloheximide)[b]	50 ppm	0.0	6.0
	100 ppm	0.0	0.0
Bichloride of mercury	1-500	8.0	36.0
	1-1000	12.0	24.0
Captan (N-trichloromethyl-mercapto-4-cyclohexene 1:2-dicarboximide triozine)	2 lb/100	6.0	50.0
	4 lb/100	4.0	50.0
Pfizer 2601-109 (Terramycin and Polymixin)	50ppm + 25 ppm	20.0	52.0
	100 ppm + 50 ppm	6.0	54.0
Phix (phenyl mercuric acetate)	2 oz/100	2.0	50.0
	4 oz/100	4.0	50.0
Phytomycin (streptomycin nitrate)	100 ppm	0.0	10.0
	200 ppm	0.0	4.0
Semesan bel (hydroxymercurinitrophenol 12%; hydroxymercurichlorphenol 2%)	0.5 lb/7.5 gals	8.2	32.0
	1.0 lb/7.5 gals	14.0	26.0
Terramycin (soluble) (oxytetracycline)	100 ppm	3.6	96.0
	200 ppm	40.0	34.0
	500 ppm	40.0	34.0
Streptomycin sulfate	50 ppm	30.0	—
	100 ppm	17.0	—
Mean		13.0	34.6
Untreated controls			84-100
LSD%		16.67	

[a] Based on 100 inoculated speed pieces for each treatment.

[b] Reduced seed germination from 5 to 10 per cent at both concentrations.

Fertilizer Views and News



By Vincent Sauchelli

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

The Great Importance of Top Crop Yields

"ONE thing I would like to see spelled out more specifically is the fact that good crop production is the first prerequisite of a successful farmer. I was talking to an agricultural economist last week. He felt that the main problem with agricultural economists is the fact that they do not realize the great importance of top crop yields.

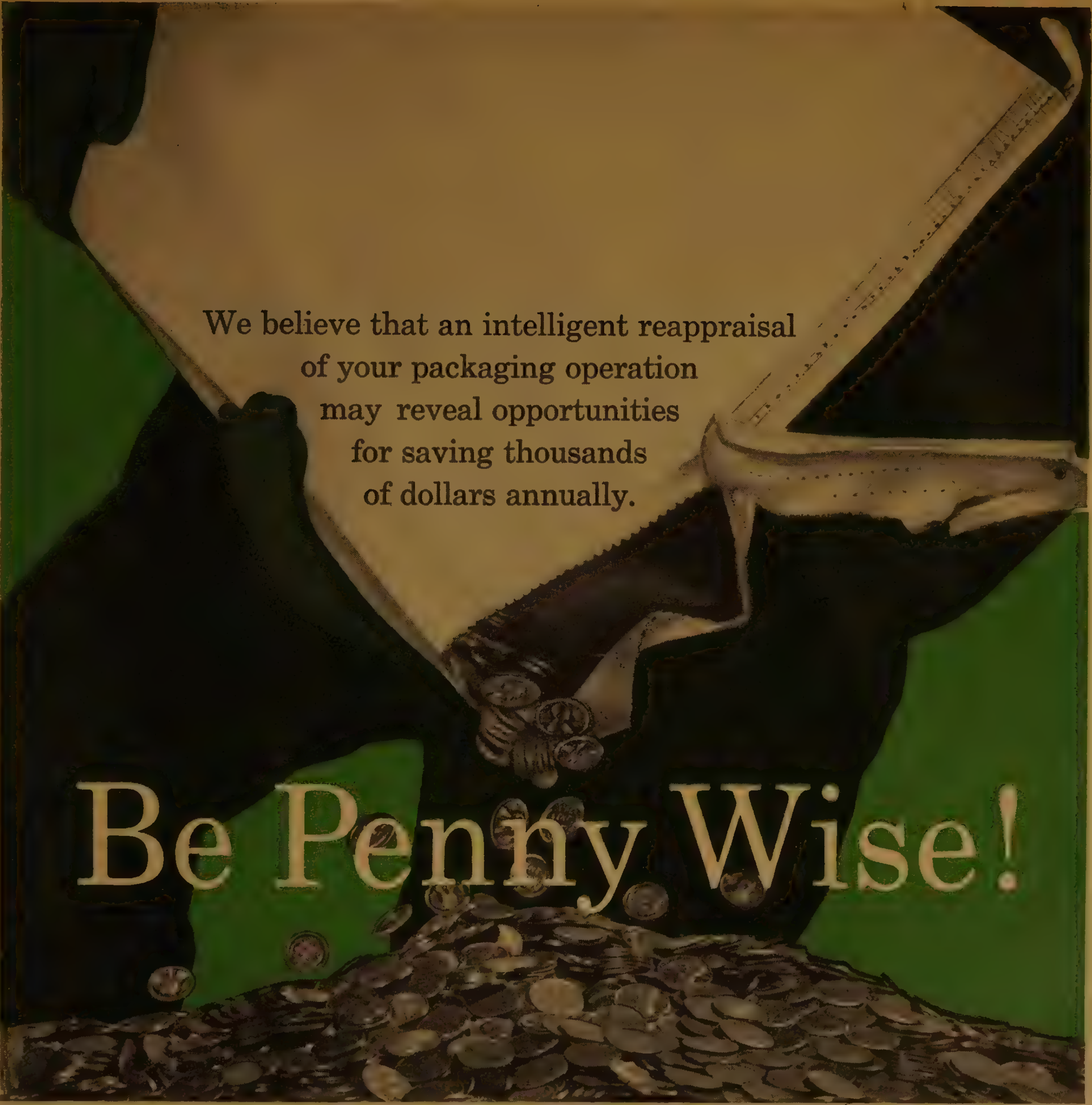
The sentiments in the above quotation were expressed to me in a private letter by one of the ablest thinkers in the fertilizer industry. He put his finger on one of the most important factors in profitable farming that needs constant, repetitive emphasis. The importance of top crop yields lies primarily in the fact that only by such yields can a farmer enjoy a profit from his enterprise. Top crop yields mean a low crop unit cost of production. And to obtain such top yields the indispensable tool in modern farming is the prudent application of fertilizers. The right kind and amount of plant nutrients needed to obtain top yields are governed by the particular crop, the selected field and the availability of the plant food already in the soil as determined by a suitable soil test. Other factors, of course, are influential, such as the amount and kind of soil organic matter, soil moisture and structure, lime, and secondary and trace elements.

The farmer should have a good understanding of the plant nutrient requirements of each crop and learn how to supply those requirements most effectively. This may be a counsel of perfection. The recent NPFI Survey of "Farmers' Attitudes Toward the Use of Fertilizer" revealed only too clearly that the average American farmer, operating 100 or more acres, does not understand the fundamentals of chemical fertilizers. With such limited knowledge and general lack of understanding about fertilizers the practice of selecting and applying the right kinds and amounts of fertilizers for each crop may be beyond his capabilities. The Survey did show that the average farmer seeks information and advice from others as a means of overcoming his uncertainty and deficient knowledge. The local county agent, fertilizer dealer, extension service worker, the farm journals and fertilizer technical service men and salesmen must be relied upon as sources of information on the whys and wherefores of top crop yields. These are the men Mr. Average Farmer goes to for guidance and instruction.

Let it be conceded that most farmers who are using fertilizers know that they do more or less what is expected of them: they "work." Many have the ready cash to invest in larger amounts of fertilizer than currently used, but lack the information and confidence to put on their crop land enough fertilizer to get the greater total profit per acre—that is, top crop yields. Why is this? Fertilizers have been known and used for close to a century. The NPFI Survey showed that farmers generally consider the use of fertilizers is good but are very cautious in the amount they would use if they had plenty of money. Lack of adequate knowledge of how plants feed and how plant nutrients influence the quantity and quality of crops, fear that an excess of the amount now used would "burn out the crop" and other negative factors were revealed by that survey.

Undoubtedly many reasons exist why a farmer will buy fertilizer, but the all-impelling factor is the desire to earn more money. When he pays out $1.00 for fertilizer he believes his chances are good of making that $3.00 to $5.00 extra crop value on his investment that he has been led to expect. Thus, economic considerations become the central, motivating power that generates sales.

We in the fertilizer industry will have to organize a simple, straightforward method of showing the farmer the economic value of fertilizing for top crop yields. This has been done in the case of most commercial vegetable crops, cotton, tobacco, citrus, sugar cane and a few others. These crops are generally well fertilized because of their high per-acre value. This has not yet, apparently, been shown for pastures and grasslands. But even in the case of those special crops which are now fairly well fertilized, the records show that they are not uniformly fertilized at a high level. In general, the



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every State are far below those recommended by the local authorities for top crop yields and optimum returns. The average per-acre application of plant nutrients*, for example, in the Southeastern States for the following specified crops has been remarkably low:

Corn, 15 lbs. of nitrogen, 13 lbs. of P_2O_5, 8 lbs. of K_2O.

Cotton, 15 lbs. of N, 15 lbs. P_2O_5, 10 lbs. K_2O.

Rice, 11 lbs. of N, 8 lbs. P_2O_5, 4 lbs. K_2O.

Tobacco, 37 lbs. N. 90 lbs. P_2O_5, 65 lbs. K_2O.

Progress is being made, however, even though it is slow. Our job as advisers to farmers is to impress upon them the economics of fertilizer usage: that profit returns are highest when fertilizer applications follow experiment station recommendations and are combined with good soil management practices, seed of superior varieties, optimum plant populations, weed and pest control, and liming. This program presented in simple, jargon-free language and adapted *as nearly as possible to the farmer's specific needs spells "Profit."*★★

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*Figures given by Dr. W. E. Colwell (N.C. Expt. Station in 1953).

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African Weed Conference

The first national African Weed Control Conference was held in Livingstone, Southern Rhodesia, July 23 to 25, 1958. The conference was sponsored by Fisons Pest Control Limited, Saffron Walden, Enland.

Panel discussions were held on brush and scrub control, weed control in grain crops, general weed problems, control of perennial grasses, weeds in plantation crops, and experimental methods with herbicides.

C. E. Horton, research director of Fison Limited, was chairman of the conference. Dr.E. K. Woodford, Agricultual Research Council, Oxford, England, gave the opening address.

A R I Panel On Fertilizer Industry Problems

ON October 13, 1958 the Agricultural Research Institute (ARI) is sponsoring a panel at its National Academy of Sciences headquarers in Washington, D. C. which should interest all members of the fertilizer industry. The panel is to discuss problems related to agriculture as experienced by the fertilizer producing industry. Moderator for the panel is Vincent Sauchelli, Chemical Technologist, NPFI The panelists include representatives of the industry; namely:

Dr. M. B. Gillis, Director of Research International Minerals and Chemical Corporation. He will discuss: Technical Problems in the Fertilizer Industry.

Dr. E. D. Crittenden, Consultant, Allied Chemical Corporation. He will discuss: Problems in the Industry Related to Research and Recommendations by Agricultural Experiment Stations.

Mr. Edwin Cox, Chemical Engineer, formerly with Virginia-Carolina Chemical Corporation. He will discuss: Business Problems in the Fertilizer Industry.

WHAT THE ARI IS:

The ARI is an organization affiliated with the Agricultural Board, a unit of the National Research Council. It is made up of 2 categories: (1) corporations and individuals engaged in all the various phases of agricultural services: in production, processing and marketing of agricultural products; in manufacture of materials and equipment used in the production and transportation of farm products. (2) State and federal research organizations, academic institutions, scientific societies and other groups related to the science of agriculture. At present a considerable number of firms engaged in the production of fertilizer materials and mixed fertilizers are members. However, the representation is inadequate considering its magnitude and importance in the national economy.. This may be due largely to the fact that the ARI has not sufficiently publicized its activities. More should be known about its contributions and potential services to the welfare of agriculture and the fertilizer industry.

The National Research Council was organized by the National Academy of Sciences back in 1916 at the request of President Woodrow Wilson as a measure of national preparedness. The Academy was created in 1863 by an act of Congress during Lincoln's administration. It was designed to be a non-profit unit, free and independent of pressures from political or vested interests and hence available to government agencies as a source of unbiased, objective advice on scientific matters. Through its boards and committees it can call on the entire scientific potential of the United States without cost except for traveling expenses. The Council is made up of eight main Divisions among which of interest to fertilizer people are the Division of Biology and Agriculture and the Division of Chemistry and Chemical Technology. These Divisions carry on their work through permanent Boards and Institutes and for special projects through committees, sub-committees and panels. One of these of interest to our industry is The Agricultural Board, established in 1944, to advance and interpret scientific knowledge pertaining to agriculture and initiate and provide recommendations relative to agriculture based on objective analysis and to publicize technical and other pertinent information. Some idea of its activities can be had by reference to a few of its outstanding published contributions:

Nutrition and Reproduction of Farm Animals.

The Fluorine Problem in Livestock Feeding.

(Continued on Page 109)

Arcadian News

Volume 3 For Manufacturers of Mixed Fertilizers Number 9

Hopewell Plant 30 Years Young!

Called "one of the greatest chemical achievements in America!"

Looking back over the years to 1928, Nitrogen Division, Allied Chemical, can take pardonable pride in its Hopewell, Virginia, plant. For Hopewell started BIG (biggest nitrogen plant in the country) and is probably the largest in the world today! In addition, this plant helps Nitrogen Division offer fertilizer producers *the most complete line* of nitrogen products (backed by the *most* nitrogen experience) in the industry!

First Units Built in 1928

In a real sense, the Hopewell plant was the culmination of all the ammonia research and experimentation begun at Laurel Hill, Long Island, N. Y. by the group that later formed Nitrogen Division . . . continued at Sheffield, Alabama . . . and carried into commercial production by Allied Chemical at Syracuse, New York. By 1928 the first units at Hopewell were completed. From the start, plant production kept increasing, until—by the end of 1930—it approached 200,000 tons of nitrogen a year! At the time, this was the largest output in the world outside Germany!

Key Nitrogen Unit in National Defense

For the first time, with the construction of the Hopewell plant, the United States became independent of foreign supply of nitrogen. No longer would there be anxious moments over availability of nitrogen materials for fertilizers in peace, or munitions in war. In 1941, Nitrogen Division expanded facilities at Hopewell, making it the most important nitrogen unit in the nation's defense program.

Hopewell Tomorrow

Termed, in its early days, "one of the greatest chemical achievements in America", the Hopewell plant has fulfilled its promise by constant growth and great flexibility in meeting the changing demands of the business it serves. It will continue its role as Nitrogen Division headquarters for nitrogen research and development.

Working closely with the technical staffs of sister plants at South Point, Ohio, and Omaha, Nebraska, Hopewell will maintain a continuing search for more and better nitrogen solutions for fertilizer production. The pay off is *yours* —in *more* business . . . *bigger* profits! Standardize on Nitrogen Division!

Arcadian News *for Fertilizer Manufacturers . . . .* **from NITROGEN DIVISION**

Allied Chemical Research Created and Developed Nitrogen Solutions

Use of superphosphate as an absorbent for ammonia goes back as far as 1873. However, this process was not to attain any commercial importance until development of the synthetic ammonia process many years later.

In 1921, at Syracuse, New York, Allied Chemical became the first to produce synthetic ammonia commercially in the United States. The fertilizer industry was quick to see and capitalize on the advantages offered by ammoniation of superphosphate. Cost-wise, the formulation of mixed fertilizer with nitrogen, using low-cost ammonia, was very attractive. What made it even more attractive was the fact that superphosphate, the other component of the reaction, was already the mainstay of the mixed fertilizer industry. In fact, use of nitrogen in the concentrated form of ammonia, not only simplified formulation but actually improved the physical condition of the superphosphate and reduced curing time.

However, the proportion of nitrogen that could be put into a mixture in the form of ammonia proved to be limited to the absorption capacity of the superphosphate, and by the tendency of overly alkalized phosphate to revert to insoluble form.

Development of Solutions

In February, 1929, an Allied Chemical researcher reasoned that he could put additional quantities of nitrogen into superphosphate by making use of the solvent power of ammonia on other nitrogen compounds. Experiments soon proved him right—and Allied Chemical scored another "first": the ammoniation of superphosphate with ammoniacal salt solutions.

Test experience with this new method showed that one of the most important salts that could be used in ammoniation solutions is ammonium nitrate. Indeed, this combination of nitrate nitrogen and ammonia nitrogen proved to be desirable from an agronomic viewpoint for the following reasons: 1) Ammonium nitrate is extremely soluble in ammonia, providing solutions of high overall nitrogent content. 2) Being a commercial chemical in great supply, ammonium nitrate is economical. 3) With the proper blending of ammonia, ammonium nitrate and water, it is possible to obtain solutions that permit ammoniation of many types of mixed fertilizers with safety, convenience and adaptability.

First Commercial Use

In October, 1929, Allied Chemical supplied a solution of ammonium nitrate in ammonia to ammoniate approximately 100 tons of superphosphate in a plant test at Norfolk, Virginia. This was the first commercial ammoniation of fertilizer with an ammoniacal ammonium nitrate solution.

The solution used at Norfolk was the forerunner of Allied Chemical's NITRANA type solutions, introduced to the fertilizer industry in 1932. On April 13, 1937, Allied Chemical was granted U.S. Patent No. 2,077,171 to cover use of the NITRANA type solutions in ammoniation. Since that time, use of NITRANA solutions has expanded rapidly, and they are now one of the largest sources of nitrogen used by the mixed fertilizer industry.

Another benefit from ammoniation with solutions containing highly soluble salts such as ammonium nitrate is the development of temporary plasticity in the mixtures. During ammoniation at high rates, temperatures are attained that develop sufficient liquid phase in the mixture to confer good granulating characteristics. This incidental reaction has greatly aided the development of granulated fertilizers in recent years.

Allied Chemical chemists and engineers have known about and made laboratory studies of this particular aid to granulation since the early years of ammoniation. As far back as March, 1938, in Baltimore, Allied Chemical engineers were supervising plant scale tests of granulation of commercial mixtures with NITRANA solutions. During the 20 years since these tests, Allied Chemical has continued to pioneer in developing improved granulation techniques.

What's in the Future?

Nitrogen Division of Allied Chemical will continue its highly specialized research and development work in a never-ending search for new and improved nitrogen solutions. As in the past, the results of these efforts will be made available to producers just as soon as possible.

Meanwhile, make *your* future more profitable by making Nitrogen Division your headquarters for nitrogen products!

Entrance to one of the Nitrogen Division, Allied Chemical, Research Laboratories

Arcadian News *for Fertilizer Manufacturers* . . . . *from* **NITROGEN DIVISION**

Make Your Own Ureaform Nitrogen with N-dure®

Easy to Use in Regular Ammoniating Equipment

A product of Allied Chemical research, N-dure urea-formaldehyde solution is the new chemical that makes it easy for you to upgrade the quality and the mechanical condition of your mixed fertilizers.

By using N-dure, in combination with urea, along with nitrogen solutions and other ingredients in the manufacture of mixed fertilizers, you can produce your own ureaform nitrogen right in your own plant during the process of mixing fertilizer. For each 20 pounds of N-dure and 40 pounds of urea you produce one unit of high-quality ureaform nitrogen. The result is a high grade, granular-type, non-dusty, non-segregating mixed fertilizer that releases nitrogen slowly over the entire growing season. The fertilizer is odorless, easy-to-spread and non-burning.

N-dure is Easy to Use

Instead of adding ureaform nitrogen to your fertilizer as a separate ingredient, it pays to make your own ureaform nitrogen during the mixing process. You get a better quality product at about half the price you would pay for a ureaform material. And the ureaform nitrogen you make by using N-dure is chemically blended with the other ingredients in your mixed fertilizer.

N-dure is easy to use in your standard ammoniation apparatus, with, at most, only a few minor alterations in methods and equipment. Even where maximum conversion to this process is desired, the required alterations are reasonable in the light of the profitable results. Fertilizer manufacturers are finding that it is just as easy to learn how to use N-dure as it was to learn how to use nitrogen solutions.

Wide Variety of Ratios

N-dure enables you to economically formulate a wide variety of combinations of quickly-soluble and long-feeding nitrogen. You can easily control the ratio of fast-acting nitrogen to long-lasting nitrogen. You can make high-nitrogen, high-analysis fertilizers that are non-burning and leach-resistant.

The development of N-dure has opened up bright new vistas of profit for the fertilizer manufacturer. Fertilizers made with N-dure are now being used on many specialty crops. Fertilizers made with N-dure would have been ideal for many field crops under heavy rainfall conditions such as we had last Spring.

The Home Garden Market

But the biggest market for fertilizers made with N-dure today is the non-farm market. Twenty-two million home gardeners use more fertilizer per acre than farmers and pay a higher price for it. Highways, golf courses, playgrounds, cemeteries and nurseries are also big users of fertilizers.

These consumers prefer one-application, high-analysis, labor-saving fertilizers. That's why the new mixtures made with N-dure are proving very attractive. It will pay you to take advantage of this new interest in fertilizers to increase your sales and your profits.

Get the Facts!

Find out how easy it is to use N-dure to make your own ureaform nitrogen while you are making your mixed fertilizers. The demand for fertilizers containing enduring nitrogen is growing fast! Get your share of this booming market with N-dure. A Nitrogen Division technical service representative will be happy to show you how simple it is to fit N-dure into your production. Contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

HERE'S THE BIG LINE OF

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

Arcadian NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	−25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	−36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	−30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	−52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6	42.0	19.5	66.3	6.0	8.2	9.3	1.178	10	34
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	−15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	− 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	−17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

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What is Considered Adequate Instrumentation for Satisfactory Plant Control?

By Walter J. Sackett, Sr.

My opinions relative to this question are based on the continuous granulation of mixed fertilizers. Basic instrumentation, in my opinion, consists of:

A. Instruments required to measure and/or record the flows of liquids and solids to the ammoniator.

B. The instruments required to control the dryer.

A. — While an elaborate system of instrumentation can be used in a continuous process for the production of granular mixed goods, such an arrangement can become so complex that its cost cannot be justified. Rather than take the time necessary to dwell on a detailed description as to what the ultimate in instrumentation would consist of, the following thoughts are limited to the practical aspects of instrumentation based on experience at A. J. Sackett & Sons.

So far as the instruments required to measure and/or record the flow of liquids and solids to the ammoniator are concerned, it is imperative that adequate means be provided for accurately controlling and indicating the flows. For this purpose, rotameters are the most widely accepted means of accomplishing such control of the liquids. Our experience has shown that these meters should preferably be supplied with recording and totalizing devices. It strikes us that the extra money spent for such recording and totalizing devices is a wise investment in that it permits a day-to-day record to be kept of each operating period. In this way, should some problem of analysis or operating condition develop, the records made by the recording devices on previous runs of the same grade can be used to good advantage.

The continuous scale used to weigh the pre-mixed solids to the process should, likewise, be equipped with some method of determining the rate of flow being weighed by the unit. It is our opinion that tie-in devices, which attempt to correlate the flows of liquids with permitted fluctuations in the flow of the solid materials, are unnecessary and, as a matter of fact, can cause serious operating and maintenance problems. We have found it best to set all materials, both liquid and dry, to some predetermined rate of flow and maintain them at that point.

B. — So far as the instrumentation of dryer control is concerned, we feel that it is necessary to employ accurate control instruments including a potentiometer to regulate the temperature of the inlet gases automatically, and this automatic equipment should obtain its signal from a control unit set up to measure either the temperature of the exit gas or of the material in process as it leaves the dryer. This instrumentation is, perhaps, the most important control in the process. Its cost will be returned within a relatively short period of time by fuel savings alone.

Other dryer instrumentation includes such items as high temperature safety devices, which prevent overheating of the combustion chamber, and approved flame safety units which should be installed to afford safe operation of the burner equipment to satisfy insurance requirements. It is sometimes advisable, depending upon the size of the operation and the complexity of the formulation, to install a multi-pen type recording instrument to record temperatures at, perhaps, four to five places throughout the system. However, we feel that this type equipment can be justified normally only on the larger granulating units.

It must be understood that the opinions expressed in my discussion relative to dryer instrumentation actually revolve around the attempt to approximate material-in-process moistures through dryer temperatures.

We feel there is a definite need for one additional type of control instrument which, to our knowledge, is not available in any performance-proved unit. The unit we refer to would have the ability of continuously recording moisture of the material as it leaves the dryer.

The discussion on this and the following page was presented originally at the Fertilizer Industry Round Table Meeting in Washington, D. C., November, 1957.

Mr. Walter Sackett, is with A. J. Sackett & Sons, Baltimore, Md.

The following comments, which continue the review of plant instrumentation were made by R. T. Webber, Monsanto Chemical Co., St. Louis, Mo.

Comments by R. Webber

The question should be broken down into two parts; namely, (1) batch ammoniation for production of either nongranular or granular fertilizers, and (2) continuous operations for the production of either granular or nongranular materials.

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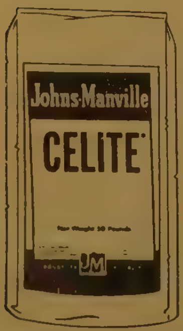

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The initial consideration in batch systems for the production of nongranular fertilizers, by far the biggest single consideration, is the accurate weighing and liquid metering systems for the proportioning of raw materials. Weighing systems may consist of a scale mounted weight hopper or a floor mounted scale over which the raw material passes into the process. Liquid metering can be accomplished by a system of scale mounted measuring tanks operated either manually or automatically, while metric measuring tanks are a third and less frequently found system.

Positive displacement type meters with provision for automatic shut-off after delivery of a pre-set amount of liquid are required. Various combinations of the above have been used successfully.

The volumetric method is used for metering solutions. A calibration chart using water as a calibrating fluid can be used in conjunction with published physical constants of the various nitrogen solutions to maintain desired accuracy. If an automatic shut-off meter is employed, or an automatic scale tank, the error inherent in human judgment required for any type of manual operation is minimized.

The positive displacement type of meter is also an excellent device for inventory control purposes, because of its built-in totalizing feature. There are plants in which granular fertilizers are produced batch-wise, normally by batch ammoniation followed by continuous granulation, drying and cooling. Generally in this type of operation the weighing, liquid metering, and batch ammoniation apparatus associated with nongranular fertilizer production is utilized in conjunction with some means of smoothing out surges to feed continuous drying, cooling, and classification equipment. Two and sometimes three additional liquid raw materials are used; namely, sulfuric acid, phosphoric acid, and water. The same remarks listed earlier in liquid metering apply to these three materials. The even larger number of liquid materials makes the choice of positive displacement instruments even more attractive from the control viewpoint, provided these materials are reasonably free of sludge.

If spent or by-product sulfuric acid or wet process phosphoric acid is used in formulations, periodic cleaning of a volumetric type measuring boot or positive displacement type meter is recommended to insure sustained metering accuracy.

Considering completely continuous systems for production of either nongranular or granular fertilizers, the significant instrumentation problems are associated with solids weighing and metering, liquids weighing and metering, and temperature control. These cover the three general areas.

Solids weighing devices may include a time-sequence batch weigh and mix system followed by some means of ironing out fluctuations in continuous feed system, or may be of the gravimetric weigh-belt feeder type. Liquid metering devices include the variable area flow meter, with its low temperature limitations discussed previously.

To recount the various methods available to meter viscous liquids, these are: metering pumps, positive displacement meters which can be equipped with tachometers to give a measure of instantaneous rate as well as totalizing feature; round edge orifice meters which exhibit some degree of immunity to viscosity changes; and the magnetic flow meters which have recently been introduced both by the Foxboro Company and the Fischer-Porter Company. In time sequence batch systems a surge hopper equipped with a variable speed belt is used commonly.

An approved but more expensive method of continuously metering solids uses one or more gravimetric weigh belt feeders. Under such a system, pre-mixed rock solids are fed continuously by single weigh belt feeder — or solid raw materials are fed individually, using a series of feeders feeding material onto a single belt. Either system is considered adequate provided routine calibration checks are made. In the time-sequence system as well as the weigh-belt method, some independent means of checkweighing the total stream being delivered to the ammoniator is considered essential to good control of grade analysis. No straight volumetric feed system is adequate for a continuous ammoniation system where various grades are made at varying production rates.

The unit used most commonly for metering liquid materials in the industry is the variable type flow meter with either manual or automatic control. Nitrogen solutions, anhydrous ammonia, sulphuric acid, phosphoric acid and water can be metered and/or controlled accurately with this device in the majority of cases, and in most cases this is the most economical approach.

The question of manual vs. automatic control must be resolved on an individual basis. How much instrumentation is justified depends on what is required to produce a quality product at adequate production rates and minimum costs. No generalization can be made here without consideration of the individual plant size and peculiar problems.

The subject of metering viscous liquids has been covered adequately, so I will get on to the production of granular fertilizers on a continuous basis. Essentially the same system is used except that agglomeration is promoted and a drying and cooling problem is presented. The minimum instrumentation for carrying out the drying operation could consist of a flame protective device and temperature limit cut-off to eliminate the possibility of explosion from accumulation of fuel and air and to protect the equipment from excessively high temperature. In addition, a device to indicate temperature of the input gases and temperature of the exit gases from the drying operation is essential.

At the other end of the scale, almost completely automatic control of the drying and cooling operations may be realized if production capacity and production costs will justify it. Rather than cover this subject, I would refer the reader to the several excellent discussions given in the 1956 Fertilizer Round Table. Mr. Foltz of General American Transportation

(*Continued on Page* 109)

Lindane for Stored Wheat and Shelled Corn

STUDIES were conducted with lindane on wheat and shelled corn in the standard circular 3,250-bushel metal bins of the Commodity Credit Coropration. After the protective treatments were applied, the grain was sampled monthly to determine the insect population trends, moisture content of the grain, insecticidal residues, depletion of insecticide by bio-assay tests, and commercial grade. In tests with wheat, the fate of the insecticides was traced through milling and baking tests.

Four series of tests were made, one with wheat and three with corn, at dosages of 2.5 and 5 p.p.m. (parts per million) in wheat, and 2.7, 4.5, 5.4, 8.0, and 10.7 p.p.m. in corn. Observations on insect population trends showed that these dosages were inadequate to protect the grain from excessive insect infestation for long periods of time (1 year or more).

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In wheat receiving 2.6 p.p.m., the recovery of lindane in the residue analyses was frequently in excess of the application rate. In the series receiving 5 p.p.m., the recovery was close to the amount applied.

Milling tests showed that the lindane was carried over into the milling fractions, the largest amounts being found in the bran and shorts. Small amounts were found in the first and second clear flours, with less than 1 p.p.m. in the patent flour.

In bread baked from flour containing known amounts of lindane, it was found that baking reduced the residue only slightly.

Bioassay tests and chemical analyses showed that there was very little depletion of the lindane with age.

There was no change in the overall moisture content of the grain during the period of these studies.

No change in the commercial grade occurred during the observation period.

In the tests with shelled corn, the residues found in the corn receiving 2.7 p.p.m. were about 90 percent of the application rate; at 4.5 p.p.m. the recovery was 69 percent, and at 5.4 p.p.m., 56 percent.

Analysis of residues from 16 locations in the corn in 1 bin showed that the largest amounts were found in the upper 5 feet of corn.

The moisture content of the corn changed only slightly during the period of these tests.

The commercial grade was not affected by the treatments. However, the corn in 15 of 29 bins in the study was down-graded from 1 to 5 grades because of the increase in the grade factor "total damage," due largely to accumulated moisture in the surface grain during the winter months.

Eight species of stored-grain insects were found in the wheat, the 3 most abundant being the saw-toothed grain beetle, the dermestids *Trogoderma* spp., and the lesser grain borer.

In corn, a total of 15 species was observed, the 3 most abundant being the saw-toothed grain beetle, the red flour beetle, and the flat grain beetle.

It should be noted that no tolerances have been established for the use

of lindane as an insecticidal treatment for the prevention of insect infestation in stored grain. The tests reported are exploratory studies to develop information that can be used in considering the establishment of tolerances. Until such tolerances are announced, the lindane protective treatments should not be used.

H. H. Walker and H. D. Nelson, Manhattan, Kansas. "Evaluation of Lindane for the Protection of Stored Wheat and Shelled Corn from Insect Attack." USDA, Marketing Research Report No. 234.

LITERATURE AVAILABLE

EVALUATION OF SYNERGIZED PYRETHRUM FOR THE CONTROL OF INDIAN-MEAL MOTH IN STORED SHELLED CORN, by James K. Quinlan and Robert F. Miller. This report presents the results of the first year's test with a synergized pyrethrum spray applied to the top surface of bulk shelled corn at different dosages and frequencies to control infestation. Marketing Research Report No. 222, March 1958. U. S. Government Printing Office, Washington 25, D. C.

AC

HISTORY AND STATUS OF THE GREEN PEACH APHID AS A PEST OF TOBACCO IN THE UNITED STATES, by F. S. Chamberlin. A study of a pest which suddenly seems to have become a permanent pest of tobacco in the U.S. The booklet cites losses caused by the aphids and lists control measures. Technical Bulletin No. 1175, U.S.D.A., U.S. Government Printing Office, Washington 25, D. C.

AC

COTTON INSECT CONTROL, by Newton W. Flora. Suggestions for season-long control of cotton insects in Oklahoma for 1958 are included in this booklet which lists schedules for both dusts and sprays. Circular E-499, Revised April, 1958. Oklahoma Agricultural Extension Service, Stillwater, Okla.

AC

WEED CONTROL RECOMMENDATIONS FOR MISSISSIPPI. A 35-page bulletin based on the results of studies conducted by research workers over several years. Herbicides and application equipment are discussed in detail and recommendations are given for specific weeds and crops. Tables are included listing calibration data, rates of application, and mixtures of chemicals. Bulletin 556, Feb. 1958. Agricultural Experiment Station, State College, Miss.

AC

MAINE FARM RESEARCH, A QUARTERLY PROGRESS REPORT. This is a 23-page booklet containing ten brief articles on some recent developments by researchers at the University of Maine. The articles discuss techniques, results of experiments, etc. Summer Issue, Vol. 4, No. 2, Maine Agricultural Experiment Station, University of Maine, Orono, Maine.

Ureaform Tests in 3rd Year

Forty-eight miniature "lawns," each with an area of four square feet, are helping an Experiment Station soils expert learn how grasses respond to complete fertilizers of two kinds. The nitrogen in one of these fertilizer mixtures is quickly available to the grass but is easily leached away by rainfall or watering. In the second mixture, the nitrogen becomes available to the grass more slowly but is less easily leached away.

H. G. M. Jacobson of The Connecticut Agricultural Experiment Station is comparing urea-form, an organic nitrogen carrier, with inorganic ammonium nitrate in complete lawn fertilizers. The plot experiments are now in their third year. During the first two years, plots with nitrogen from the inorganic source (ammonium nitrate) grew more grass and were better or as good in appearance throughout most of the season. Comparative costs are not being considered, but the inorganic nitrogen mixture is less expensive than the same amount of plant food from the organic nitrogen carrier.

But Mr. Jacobson finds that the difference in dry weight of clippings, a measure of grass grown, decreased in 1957 as compared with 1956. Since organic nitrogen becomes available slowly, the difference may be even less in 1958, the third year of the experiment. Plots treated with the organic nitrogen mixture produced 84 per cent as great a weight of clippings in 1956 as did the plots treated with the inorganic nitrogen mixture. In 1957 the comparable figure was 95 per cent.

All plots were new seedlings in 1956: 45 per cent Merion bluegrass, 45 per cent creeping red fescue, and 10 per cent Astoria bent.

After comparable fertilizer applications before seeding, each series of plots receives annually an application of 10-6-4 fertilizer at the rate of 18 lbs. to 1000 sq. ft. All of the mixture containing urea-form is put on in one early spring application. The mineral nitrogen plot series gets two applications, 10 lbs. in the spring and 8 lbs. in the fall.

As of late May, in this year of heavy spring rainfall, advocates of either organic or inorganic nitrogen lawn fertilizers can see among these plots some that "prove" their point. Differences in grass growth within each treatment series are apparently greater than those between the two series. Available for inspection during regular Station hours of 8:30 to 5 on weekdays, the plots are just north of the greenhouse attached to the Soils building of the Station at 123 Huntington Street, New Haven.

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Broadcaster for Pesticides

Granular formulations of pesticides, due to ease of application, low residue hazard on food crops, and diminished hazard to applicators, are playing an increasingly important role in control programs for various insect pests. An applicator for the sheet distribution of granular materials has been tested, and its performance with various grades of attapulgite granules and granulated insecticides (under various types of field conditions) is described. This equipment has flexibility in that it may be adjusted to provide uniform deposits of the same material over various swath widths or to provide a range of swath widths with materials which vary greatly in particle density. This is accomplished primarily through the fact that delivery of the granules into the rotor blades may be adjusted over a 300-degree arc, making possible the selection of a location of the feed orifice for a given granulated material which will result in a uniform deposit on the ground. M. S. Mulla and M. M. Barnes, "A Twin-Rotor Broadcaster for the Application of Granulated Insecticides"; *Journ. of Econ. Entomology*, 51, No. 3, p. 278 (1958).

•

Pesticides For Cotton Leafworm

Widespread and sporadic outbreaks of the cotton leafworm in the fall often catch farmers and insecticide dealers by surprise. The problem is not the failure of recommended control measures, but rather of having an adequate supply of insecticides available for immediate use late

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in the season. It is important, therefore, to know the toxicity of various new insecticides.

Materials investigated included: guthion, toxaphene, endrin, sevin, CP7769, malathion, phosdrin, Hercules AC-528. All materials tested gave satisfactory control within a 48-hour test period, although some appeared to give better control than others. Hercules AC 528 gave excellent control, but had a slower killing action than any of the other materials. P. L. Adkisson, *Jour. of Econ. Entomology*, 51, No. 2, p. 259 (1958).

•

Alfalfa Aphid Resistance

During the later summer of 1956 an increasing number of failures were reported in alfalfa fields where parathion and malathion were used to combat the spotted alfalfa aphid, *Therioaphis maculata* (Buckton), in southern California. A survey of the troubled area strongly indicated the presence of a resistant strain of aphids. Field tests showed that the aphid has developed a low degree of resistance to parathion and Trithion in localized areas. In one test, malathion, Phosdrin, and demeton (Systox) applied at 9.1, 0.7, and 0.9 ounces per acre, respectively, gave only mediocre control. These same dosages gave excellent control of susceptible aphid populations. Laboratory studies showed that the aphid had developed approximately 4-fold resistance to parathion residues. If time of exposure to mortality is considered, the degree of resistance is probably even greater. Resistant aphids continued reproduction when exposed to the toxicant, and many of their young survived. Reproduction in nonresistant aphids was markedly reduced, and the young died. The developmental pattern of resistance in parthenogenetic species does not progress in the same manner as in multivoltine bisexual species. Resistance probably arose through mutation after the aphid arrived in North America. V. M. Stern and H. T. Reynolds, "Resistance of the Spotted Alfalfa Aphid to Certain Organophosphorus Insecticides in Southern California"; *Jour. of Econ. Entomology*, 51, No. 3, 312 (1958).

Persistence of Residues

Alfalfa was treated in 1956 with heptachlor and aldrin at the rates of ¼ lb./acre and ⅛ lb./acre, in order to study the disappearance of those insecticides under Wisconsin conditions. Samples were collected immediately after treatment and 1, 3, 7, 14, and 21 days thereafter and were analyzed by specific chemical methods and by a direct feeding bioassay, using *Drosophila melanogaster* Meig. as a test insect. Seven days after treatment, both heptachlor and aldrin were recovered at a rate of 0.1 p.p.m., as tested by chemical analysis. However, when bioassays were conducted, the recoveries were slightly higher. In the case of aldrin, 7 days after treatment, 3.5 to 7.6 times more toxicant was recovered by bioassay as compared with results obtained by a specific chemical analysis. No heptachlor was found 2 weeks after treatment as tested by chemical and biological methods. No aldrin was found 3 weeks after treatment as tested by both methods. E. P. Lichtenstein and J. T. Medler. "Persistence of Aldrin and Heptachlor Residues on Alfalfa," *Jour. of Econ. Entomology*, 51, No. 2, P. 222 (1958).

•

Protection Of Citrus Pulp

Laboratory tests have indicated that wettable powder formulations produce heavier, longer lasting, and more toxic surface residues on dried citrus pulp being stored in warehouses than do aerosols containing the same active ingredients.

A paper describing the comparative effectiveness of these products under field conditions has been prepared by Hamilton Laudani, Hagen B. Gillenwater, Ben H. Kantack, Markaret F. Phillips, Agricultural Marketing Service, USDA, Savannah, Ga., and D. I. Murdock, Minute Maid Corp., Plymouth, Fla. The paper was presented at the annual meeting of the Institute of Food Technologists at Chicago, May 25 to 28.

The wettable powder proved to be much more effective in maintaining a low insect population in the feed than were the aerosol treatments. The tests also showed that it is practical to use monthly applications of wettable powders at a rate of 5 mg. of pyrethrum and 50 mg. of piperonyl butoxide per square foot to treat large quantities of stored citrus pulp and that the cost with wettable powders is less than with aerosols.

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Study Chelates As Nutrients

Scientists of the U. S. Department of Agriculture and several states are studying the use of chemically chelated metals to provide essential nutrients for fruit trees, ornamentals, and other plants.

Chlorotic pear trees in Oregon have responded by improved greening of leaves and increased fruit yields after chelated iron and maganese spray treatments. Soil-applied chelated zinc gave better results in the treatment of peach and sweet cherry trees in Washington State than the zinc-sulfate sprays normally applied in the early spring to correct zinc deficiency.

In Louisiana experiments on pecan trees, soil treatments with zinc chelate and zinc sulfate proved to be equally successful for a three-year period in checking "pecan rosette" caused by zinc deficiency.

Lime-induced iron chlorosis in citrus trees is being successfully combatted in Texas and California by the use of iron chelate treatments on the soil. Other experiments have shown that blueberries, normally at home in acid soils, can be grown in mildly acid or neutral soils if chelated iron is appled to the soil. This material also is being used extensively by nurserymen and gardeners to combat chlorosis in azaleas, roses, rhododendrons, and other ornamentals.

AC

ALFALFA SEED INSECTS, by E. C. Klostermeyer. A review of control methods, population trends, insecticide effects, and seed yields. The booklet deals with alfalfa in Washington. Bulletin 587, April, 1958. Washington Agricultural Experiment Stations, Pullman, Wash.

AC

MAINE FARM RESEARCH. A quarterly report of research studies conducted at the University of Maine dealing with such topics as nematodes, fertilizer needs, mite control, weed control, and rotational lime studies. Volume 6, No. 1, April 1958, University of Maine, Orono, Maine.

WASHINGTON REPORT

By Donald Lerch

THE Food and Drug Administration bombshell on fees for tolerances on new products will be opposed by NAC. The new FDA fees proposed in the *Federal Register,* August 7, would multiply all present fees by 2½ times. The reason, says FDA, is to set fees at levels to cover actual costs in setting tolerances.

This means that fees for an initial tolerance at one level for up to 9 commodities would jump from $1,000 to $2,500. Initial tolerances at two or more levels for up to 14 commodities would jump from $1,500, to $3,750. Tolerances for additional crops would involve an original deposit of $250. with $250. more for each added crop instead of $100. deposit and $100. additional, and so on. Effective date for the new fees is to be Sept. 7, 1958.

In announcing opposition to the new fee schedule, NAC Executive Secretary, Lea S. Hitchner, said the "law is for the protection of the public and not for the benefit of those requesting residue tolerances or exemptions. Accordingly, Industry feels that the cost of the administration of the law by the Food and Drug Administration should be a regular part of their operational expenses."

In line with this policy, NAC is seeking an amendment to the Miller Pesticide Residue Amendment to the Federal Food, Drug, and Cosmetic Act which will eliminate fees charged for the establishment of a tolerance, except for fees involved in using an appeal panel.

A government policy of making all government services self-supporting through fees was in effect when the Miller Amendment was passed. It was for this reason that a fee provision was added by the Government to the measure. This policy since has gone by the boards, so that Industry spokesmen have been expressing some hope that the entire fee structure on gaining tolerances might be eliminated. Action on the NAC proposals cannot be expected, however, until the new Congress convenes next year..

* * *

Farm legislation could have a major influence on pesticide and fertilizer sales next year. Certainly marketing managers will want to analyse the status of farm legislation with a view to revising recommendations to top management.

Essentially, more farmers are to have more freedom to raise and grow what they wish. Surpluses probably will mount—possibly to a new record high. Price supports will be lower—and, coupled with huge surpluses—will have a depressing effect on the general level of farm prices. The reward for efficient production will be greater. The penalty for high cost production will be higher. More farmers will go out of business—those remaining will buy more fertilizer and pesticides. While numbers of farmers will decline, the total land in cultivation will remain about the same. In short, the farm revolution will continue with even greater intensity.

These are the sifted opinions of bankers, business men, and farm leaders in and out of Washington. Perhaps the greatest single issue in Agriculture stays out of the headlines. It is simply—who will control agriculture? Integration is moving at an almost bewildering pace. More and more chemical companies are finding the prescriptions for fertilizer and pesticides being written by other than farmers. Fewer and fewer men are dictating the terms of what and how much is used.

Some Washington observers see the following possible results behind the switch to new parity yardsticks: removal of corn from commercial and non-commercial areas; the Benson price support principle for rice, corn and cotton; and the defeat of the self-help plan for dairy farmers.

And to top it all—despite government controls such as the soil bank — conservation reserve — and the like, farmers are turning in another record harvest—showing again that our agricultural productivity is a marvel of the twentieth century.

* * *

As we predicted in July, the Magnusen Bill—authorizing expanded research on effect of pesticides on wildlife has passed both Houses of Congress and has been signed by the President. The House slapped a $280,000 limit on the bill.

When actual expanded research will begin is still in doubt. The U.S. Fish and Wildlife Service has asked Congress for three-fourths of the total amount in a request for supplemental funds for fiscal 1959. If this amount is

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granted, expanded research will begin this fall. If not, U.S. Fish and Wildlife expects to get the funds for research in fiscal 1960.

What new research is in store? Three types are on the dockets.

1) Cage tests and feeding tests to determine the toxicity levels on new pesticides. U.S. Fish and Wildlife Service had conducted such tests on DDT and several other chlorinated hydrocarbons in the past. They want to put other pesticides through the same tests.

2) Run small plot studies to determine the effect of pesticides on wildlife under conditions approximating natural conditions. U.S. Fish and Wildlife expects these tests to turn up immediate and long range effects and let them know what to expect under field conditions.

3) Actual observations of mass applications of pesticides underway to check effects found in the first two categories of test. Some work in this field has begun in relation to the imported fire ant eradication program, but it has not been as thorough as the U.S. Fish and Wildlife would like.

The U.S. Fish and Wildlife Service expects this expanded research to lead to information which will help to develop formulations, application techniques, rates and times of applications which will permit mass application to control economic pests, but with an absolute minimum hazard to fish and wildlife.

While nothing was mentioned in the Magnusen Bill about liaison with the U.S. Department of Agriculture—it is understood that fairly close liaison will be maintained through a joint committee recently formed for this purpose.

The Magnusen Bill was supported by all national wildlife conservation groups, the American Forestry Association, and by NAC. The expectation is that additional scientific research will demonstrate how pesticides can be used safely to benefit the general public.★★

The surprise shift of NAC's annual meeting October 29, 30, and 31—to the General Oglethorpe Hotel in Savannah, Georgia—was based on the need for more ample facilities than expected for the Association's 25th Anniversary Celebration.

The General Oglethorpe offers villas and cottages as well as hotel rooms. Excellent golfing and water sports facilities are right at hand, and there is ample space for company hospitality rooms, in addition to very excellent general meeting rooms.

NAC's Executive Secretary, Lea S. Hitchner, is urging all those who plan to attend the Association's 25th Anniversary affair to re-register for accommodations and hospitality suites at the General Oglethorpe, Savannah, Georgia. The change in hotels from the Bon Air in Augusta to the General Oglethorpe will involve no change in meeting dates or in the meeting program.

NAC is promising to come up with a number of special events to commemorate its 25th Anniversary. Among them is publication of a new booklet, "Open Door To An Era Of Plenty," and production of a color slide program to be used in telling the story of pesticide chemicals to women's clubs and civic groups.

Incidentally, a very nice kudo was recently paid to NAC by Senator Alexander Wiley, of Wisconsin. In connection with the observance of NAC's 25th Anniversary, Senator Wiley told his Senate colleagues—"Pesticidal chemicals, dedicated to the never-ending battle of man against the ravages of nature, have changed the life of every one of us for the better . . . not only the American farmer, but the public as a whole, is deeply indebted to the miracles which have been wrought by chemical compounds as applied to agriculture." Senator Wiley concluded his remarks by congratulating NAC on its Silver Anniversary and wished the Association uninterrupted success in continuing to serve America's needs.

* * *

You can expect further public outcries from time to time against the USDA's pest eradication programs, but the chances are they will be less hysterical than in the past.

One major reason is that the success of the gypsy moth and fire ant eradication programs is beginning to win allies in the eradication areas. There's nothing as convincing as a group of satisfied customers.

The other reason is that the USDA's information program has been gathering some steam over the past few months. Extensive advance information work by USDA, State agriculture and health officials is credited with the smooth operation of the gypsy moth eradication in Pennsylvania this year.

USDA is moving ahead with plans to complete color documentary films on the Mediterranean fruit fly eradication and the eradication program on the fire ant in the South. Both are expected to impress the public with the care and effectiveness with which these programs are planned and administered..

Not everyone is completely convinced as yet, however. Rumblings of discontent with the imported fire ant eradication program are still coming from the Alabama Department of Conservation. They are satisfied that the health of humans, livestock, poultry and pets are being safeguarded—but ask, "Who will safeguard the wildlife?"

Meanwhile, the U.S. Public Health Service has announced plans to probe the effects of fire ant control on fish and aquatic life in streams and rivers in control areas. The study will seek to determine whether there is any run-off of insecticide into streams and rivers, and what effect—if any— this may have on fish, food, and aquatic life.

* * *

Do not discount completely

(*Continued on Page* 101)

NEWS about the TRADE

Entomology By Correspondence

The State College of Washington, Pullman, is offering a course in Agricultural Entomology by correspondence. The course is designed for persons with a particular interest in the agricultural applications of the subject; such as farmers, field men, custom spray applicators, chemical company representatives, extension agents, and vocational agriculture teachers.

The course is available as a non-credit course. In addition, the college is considering a request for the approval of a college credit course for next year. It would be a three semester hour course, consisting of eighteen lessons and fourteen laboratory exercises. If approved, it should be a valuable course for extension agents and agriculture teachers, to whom college credit may be important.

•

NAC Meeting in Savannah

Early in August, the National Agricultural Chemicals Association announced that its annual meeting will be held at the General Oglethorpe Hotel in Savannah, Ga., instead of in Augusta, Ga., as announced previously. The change in location is due to more desirable facilities at the General Oglethorpe, for NAC members. Meeting dates remain the same; October 29-31, 1958.

J. C. Vernon, NAC president, will open the three day meeting, which will include such speakers as: John Gillis, Monsanto Chemical Co.; Frank Washburn, American Cyanamid Co.; Senator Herman E. Talmadge, of Georgia; Charles S. Maddock, Hercules Powder Co.; Cynthia Westcott, of Glen Ridge, N. J.; Phillip Alampi, N. J. Secretary of Agriculture; H. H. Haller, USDA; William Johnson, Union Bag & Paper Co.; W. J. Garmhausen, Ohio Dept. of Highways; and M. W. Melander Stauffer Chemical Co. (See August AGRICULTURAL CHEMICALS, page 77).

•

New York Insecticide Conf.

The 20th annual New York State Insecticide and Fungicide Conference and the 11th annual Pesticide Application Equipment Conference will be held at Cornell University, Ithaca, N. Y., Nov. 11 to 13. The meetings will be held in Bibbins Hall.

•

Ripper Heads Dow Subsidiary

A subsidiary company, Dow Agrochemicals Ltd., for the manufacture and sale of agricultural chemicals in Great Britain has been formed by the Dow Chemical Co., Midland, Mich., and Dr. Walter E. Ripper, a British agrochemist.

The new company, with headquarters in London, will function as a manufacturing and marketing facility for Dowpon and, eventually, for other agricultural chemicals. Dowpon is a selective and systemic herbicide. Dr. Ripper is managing director of the subsidiary. He formerly was vicechairman and scientific advisor to Fisons Pest Control Ltd.

Dow Agrochemicals plans to import Dowpon from the United States until its manufacturing plant in Great Britain begins operation.

Bashor Shell District Manager

E. F. Bashor, sales supervisor for the Shell Chemical Corp.'s San Francisco agricultural chemical district, has been named district manager for Shell's line of agricultural chemicals in 11 western states.

Mr. Bashor succeeds L. F. Stayner, who is retiring. The new manager joined Shell in 1938, when the company purchased the insecticide business of Balfour, Guthrie and Co., for whom he then was working. He became assistant manager at San Francisco in 1949 and later that year was named sales supervisor of the insecticide group.

•

Vasek Calspray Manager

Otto R. Vasek has been named plant manager of the South Plainfield, N. J., plant of the California Spray-Chemical Corp., Richmond, Calif. The South Plainfield plant is one of four Calspray production centers manufacturing the Ortho line of insecticides, fungicides, and herbicides.

Mr. Vasak joined Calspray seven years ago and has been engaged in research engineering at Richmond.

•

Messenger to New USDA Post

Kenneth Messenger, formerly in charge of the Aircraft and Special Equipment Center, U.S.D.A., was recently appointed head of the Methods Improvement Section with headquarters at the Plant Industry Station, Beltsville, Md. He succeeds W. G. Bruce.

The functions of the Aircraft and Special Equipment Center, which will not be continued by name, will now be included in the Methods Improvement Section.

Fertilizer Round Table

Economics of processing, preventive maintenance and of formulation will be the theme of the annual meeting of the Fertilizer Industry Round Table, to be held November 5-7 at the Mayflower Hotel, Washington, D.C. Discussion of some 40 questions submitted by plant superintendents will concern:

- Superintendent's responsibility in plant operation time table.
- Engineering principles governing maintenance.
- General principles of the economics of processing.
- Principles governing economics of formulation.
- A study on bags and bagging.

As in previous years, questions will be reviewed by selected industry members, with comments from general membership.

Vincent Sauchelli is chairman of the meeting.

●

Insecticide Resistance

At the 15th International Congress of Zoology held in London early in July, several reports concerned insecticide resistance. G. Davidson, Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine reported on studies of different kinds of resistance in two different species of anopheline mosquitoes.

One was a strain of *Anopheles gambiae* from Northern Nigeria, highly resistant to dieldrin (some 800 times in fact) and cross resistant to related compounds and BHC, but still susceptible to DDT. The second species studied was a strain of *Anopheles Sandaicus* (obtained from Java) resistant to DDT (some 40 times) but susceptible to dieldrin and BHC.

The studies indicate the existence of two different types of insecticide resistance in anopheline mosquitoes, both of which are monofactorially inherited: (1) Dieldrin-BHC resistance in which three phanotypes are recognisable; these mosquitoes remain susceptible to DDT; (2) DDT-resistance in which only two phanotypes are recognisable; these mosquitoes remain susceptible to dieldrin and BHC. In practice this means that a change of insecticide is all that is necessary to continue mosquito control where resistance appears. This has in fact already been done in Java and Saudi Arabia where DDT-resistant strains of *A. stephensi* recently predominated.

●

AgChem '57 Production Totals

The Tariff Comission recently reported production and sales figures for the agricultural chemicals industry, showing production for 1957 was down, but that sales were up.

Total output of pesticides and other organic agricultural chemicals was 512 million pounds last year—or about 10 per cent less than the 570 million pounds reported for 1956. Sales were valued at $178 million, as compared to $173 million in the previous year. Sales in 1957 represented 433 million pounds, as against 399 million pounds in the previous year.

Production of acyclic pesticides and other acyclic chemicals in this group amounted to about 407 million pounds in 1957, compared with 474 million pounds in 1956—a decrease of 14 percent.

Sales were 340 million pounds, valued at $132 million, in 1957, compared with 343 million pounds, valued at $135 million, in 1956. The chemical in this group which was produced in the greatest quantity in 1957 was the insecticide DDT. The output of this product amounted to 125 million pounds in 1957.

Production of acyclic pesticides and other acyclic organic agricultural chemicals amounted to 104 million pounds in 1957, compared with the 96 million pounds reported for 1956; sales were 95 million pounds, valued at $46 million, in 1957 compared with 57 million pounds, valued at $38 million, in 1956.

Fees On Pesticide Registration

"The notice by the Federal Food and Drug Administration, published in the *Federal Register* for August 7th., announcing an increase in fees for the establishment of tolerances under the Miller Pesticide Amendment to the Federal Food, Drug, and Cosmetic Act, is causing much adverse comment by the members of the Pesticide Industry," stated Lea S. Hitchner, Executive Secretary of the National Agricultural Chemicals Association in Washington.

"Industry's position on the matter at the time the Amendment was pending in Congress, and unchanged to date, is that this law is for the protection of the public and not for the benefit of those requesting residue tolerances or exemptions," Mr. Hitchner continued. "Accordingly, the Industry feels that the costs of the Administration of the law by the food and Drug Administration should be a regular part of their operational expenses."

Mr. Hitchner remarked that it was the announced Administration policy at the time the Amendment was pending, that, as far as practicable, all government services were to be self-supporting through the collection of fees, and it was on this basis that the fee provision was inserted into the legislation. Such a government-wide program has not been put into effect. Proposed legislation introduced last year by the Food and Drug Administration, covering chemicals used in or on food, provides for no comparable fee system to cover administration of the law.

"In view of the above and due to the fact that Industry looks upon these fees as an additional 'tax on doing business'," Hitchner concluded, "The National Agricultural Chemicals Association, as spoken for the Pesticide Industry, proposes to seek an amendment to the law which would eliminate fees charged for the establishment of a tolerance."

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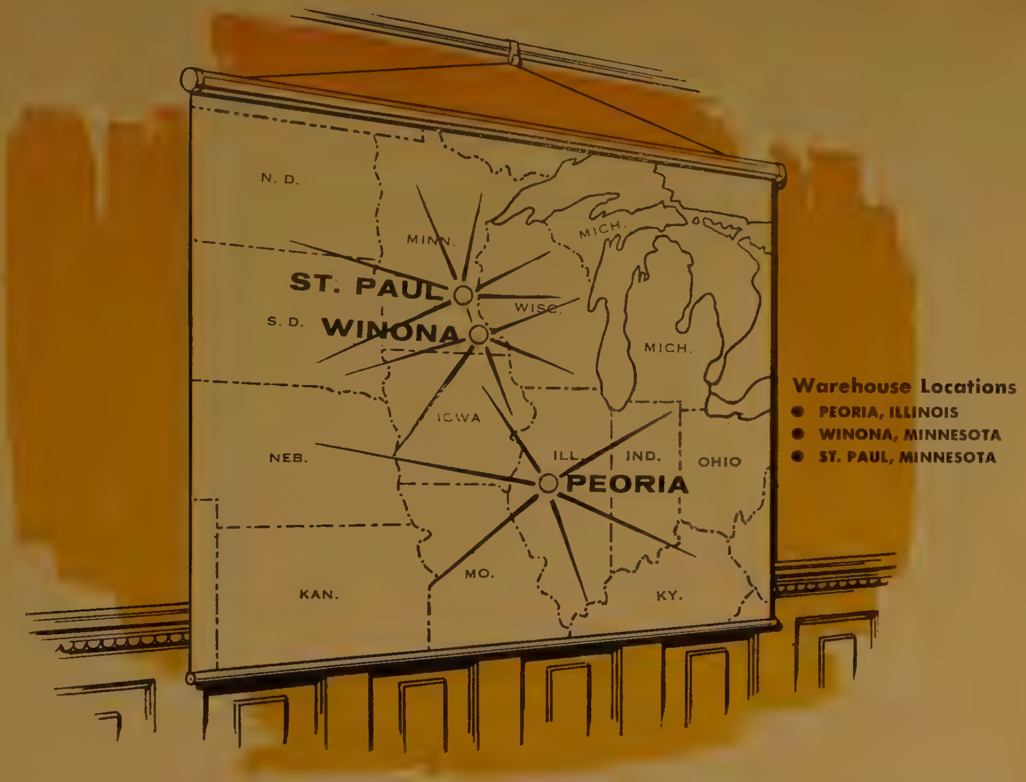

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Public Health Applications

The U.S. Public Health Service's Communicable Disease Center is accepting applications from experienced researchers in four major categories at starting salaries ranging up to $12,770. These positions are located at the center's headquarters in Atlanta, Ga., or at center activities throughout the country.

Categories of personnel needed include medical microbiologist, public health biologist, chemist, and medical entomologist. Individuals who hold doctorate degrees or who have had extensive experience in medical research are preferred.

•

IMC Sales Supervisor

Norman M. Johnson has been appointed supervisor of sales services in the marketing division of the International Minerals & Chemical Corp., Skokie, Ill.

Mr. Johnson had been with the Elgin Watch Co. as supervisor of sales research for seven years prior to joining IMC. He is located in IMC's new administrative and research center in Skokie.

•

Herrick In New Post

Dr. E. C. Herrick has been appointed chemical reserch supervisor for the Detroit research laboratory of the Cilmax Molybdenum Co., a subsidiary of American Metal Climax, Inc., New York.

Prior to joining Climax, Dr. Herrick served as a research chemist for Houdry Process Corp., Linwood, Pa.

•

Grant Is Project Engineer

Hermes O. Grant has been appointed project engineer at the International Minerals & Chemical Corp.'s Bonnie chemical plant near Bartow, Fla.

•

Missouri Society Meets

The Missouri State Horticultural Society held a summer meeting at Mountain Grove, Mo., August 7, that consisted of a short program of interest to fruit growers and a tour of the Missouri State Fruit Experiment Station.

•

AP&CC Construction Begins

American Potash & Chemical Corp., Los Angeles, has begun construction of a $5 million sodium chlorate plant at Hamilton, Miss. The new plant will have capacity to produce 15,000 tons of sodium chlorate per year.

•

CSC Names Guill

Albert P. Guill was named western field representative for the market development department of the Commercial Solvents Corp., New York. Mr. Guill is concerned with the development of new markets for the company's products in Washington, Oregon, Idaho, California, Nevada, Arizona, and Utah. His headquarters are in Los Angeles.

Mr. Guill joined Commercial Solvents in July 1954 and has been chief chemist of the Terre Haute plant laboratories since that time.

Rath Adds Fertilizer Unit

The Rath Packing Company is installing mixed fertilizer granulating facilities at their Waterloo, Iowa, plant. The granulating unit will include a T.V.A. type ammoniator, dryer, cooler and screening equipment. High analysis granular fertilizers with a particle size range between 6 mesh and 16 mesh will be produced. Completion of the project is set for the end of November 1958. The plant is being engineered and fabricated by The D. M. Weatherly Company, Atlanta, Georgia.

•

Maritime Fertilizer Meeting

The annual meeting of the Maritime Fertilizer Council was held in Kentville, Nova Scotia, last month.

Various aspects of the fertilizer industry and its relationship to agricultural progress in the Maritime Provinces were discussed and a tour of grass, potato, and tobacco experimental plots at Kentville was held.

G.L.F. 5-Star Forage Plan

THE Cooperative G.L.F. Exchange, Inc., Ithaca, N. Y., has prepared a 32-page booklet describing the G.L.F. 5-Star Forage Plan. The plan is based on research and teaching conducted at state colleges.

The booklet outlines methods for obtaining samples for soil testing. A soil sample must represent an entire field and should be taken with care. Pasture samples should be taken from the top two inches of soil, but all other samples should be taken to plow depth. Soil tests are the first essential for profitable forage crops, G.L.F., emphasizes.

The second step in the plan involves liming and fertilization. The effect of lime is shown in a 28-year field study reported by Prof. J. H. Aiken of Pennsylvania State University. A four-year rotation—corn, oats, alfalfa, alfalfa—was grown on two fields. Four tons of lime were applied to one set of fields and the other received none. The pH of the limed fields was built up to 6.8, while the other set of fields remained at 5.5. After the starting date, all fields received exactly the same seed and fertilizer, plus lime on a maintenance basis.

The initial investment of four tons of lime paid back an extra 4,500 pounds of feed each year. In total it paid back an average of $29.77 per acre per year above the return from the low pH fields. Increasing the pH to 6.8 affected all crops in the rotation.

The importance of seeds and seeding is discussed. New seedings need fertilizer, booklet points out, and they should get enough fertilizer to supply about 35 pounds of nitrogen, 70 pounds of phosphorus, and 35 to 70 pounds of potash per acre.

Checks on farms in G.L.F. territory have shown that spraying for control of spittlebugs and leafhoppers raises yields of mixed hay from 20 per cent to as much as 50 per cent. Weeds, also, must be controlled and, where oats or spring barley are seeded to legumes, excellent control of mustard and other broadleaved weeds is obtained with applications of MCP or Sinox PE.

In permanent grass pastures and hayfields, the booklet continues, 2,4-D has aided many farmers in establishing control over a variety of susceptible annual and perennial weeds.

The fifth step in the G.L.F. forage plan is harvesting. In a recent series of tests reported by Dr. K. L. Turk, head of Cornell's Animal Husbandry Department, it was demonstrated that early cutting is the most important single factor in obtaining high feeding value in forage crops. Cows on late-cut hay lost weight and were thinner than those receiving early-cut hay or silage.

After the end of a 20-week experiment, the cows on late-cut hay were shifted over to the earlier cut forages and, within a five-week period, each cow almost doubled her milk production.

It is claimed that the G.L.F. 5-Star Forage Plan will result in more milk per cow, more feed per acre, higher yields of other crops in rotation, and higher income per farm.

•

Therapy Helps Control Disease

Plant chemotherapy, or control of plant disease by compounds that reduce or nullify the effect of a pathogen after it has entered a plant, offers new possibilities in controlling disease, said A. E. Dimond, Connecticut Agricultural Experiment Station, in a report at the golden jubilee anniversary meeting of the American Phytopathological Society, August 24 to 28 at Indiana University.

So far as is now known, Dr. Dimond said, chemotherapeutants are effective in but one of three ways. They may kill or inactivate the pathogen inside the plant. They may neutralize toxins produced by the pathogen. A third mode of action results in increasing the resistance of plants to disease. This kind of action, changing the host resistance to some pathogen, is commonly shown in plants treated with growth regulating substances.

Other discussions at the 5 day meeting dealt with the beginnings and future of plant disease control in the U. S.; development of chemicals for plant disease control; obstacles to plant chemotherapy, etc.

Among the speakers were: George L. McNew, Boyce Thompson Institute; John Stevenson, USDA; J. C. Walker, Univ. of Wisconsin; James Horsfall, Connecticut Exp. Sta.; W. J. Martin, and J. B. Sinclair of LSU; A. F. Ross, Cornell University, and Paul Miller, USDA.

Spencer Direct Solutions

The Spencer Chemical Co., Kansas City, Mo., has added a line of non-pressure direct application solutions to its nitrogen products. Trademarked Ura-Greeen, the liquid nitrogen fertilizer will be produced at the company's Vicksburgh, Miss., works and Henderson, Ky., works.

Joe Tuning, who has been handling anhydrous ammonia sales, has been named to coordinate both solution and anhydrous ammonia sales. His offices are in Kansas City.

Spencer plans to market Ura-Greeen through its regular distributors and their dealers. A field storage tank program is being inaugurated whereby the company will lease tanks to its fertilizer distributors, who will make them available to their dealers. Ura-Greeen will be available in solutions of 32, 30, and 28 per cent nitrogen.

Pesticides Cut Cotton Costs

PROMISE of earlier lay-by of cotton through the use of herbicides was indicated by Carl H. Thomas, agricultural engineer at the Louisiana Agricultural Experiment Station, in a talk before the 1958 Beltwide Cotton Mechanization Conference, Aug. 12-14, in Brownsville, Texas.

He said that elimination of late season cultivations and reduction of weed and grass contamination at harvest could result from the proper use of herbicides. Mr. Thomas reported that two nozzles per row were used in tests. These were adjusted to spray the middles and the row, except for a four to five inch band centered on the top of the row.

The application of pre-planting herbicides is not at present being recommended, he said. Cultural methods of deep plowing seem to be the main control method at the present time. Although post-emergence oils do an effective job of weed control, he continued, the necessity for extreme precision in application has caused a lack of popularity. Mr. Thomas said in conclusion that, unless post-emergence herbicides can be applied with less precision over a longer period of time, their future appears rather dim as a major means of controlling weeds.

L. S. Bird, cotton pathologist, Texas State Experiment Station, told the group that, each year, for 100 bales of cotton ginned, there would have been two and one-half additional bales if seedling disease had been controlled. He said that proper fungicide placement can result in a yield increase of 35 per cent and a net return of $27 an acre.

Regarding fungicide dust applications, Dr. Bird said that the dust should be delivered to the applicators under high air velocity to prevent clogging of delivery tubes. Velocity should be reduced, however, at the applicators to allow thorough mixing of the soil with as little dust as possible.

Insecticides for the control of cutworms have been applied with fungicides with excellent results, Dr. Bird said. Other efforts, however, to achieve in-furrow disease control by applying fungicides through the hopper with the seed have not been successful, he reported.

Progress in research for the control of pink bollworm was

(*Continued on Page* 95)

A · *Russian knapweed* B · *Austrian field cress* C · *Bermuda grass* D · *Bindweed* E · *Hoary cress* F · *Canada thistle* G · *Leafy spurge* H · *Quack grass* I · *Johnson grass*

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NACA Information Director

Denis Hayley has been appointed director of information for the National Agricultural Chemicals Association, Washington, D. C.

He had been product manager for a unit of Diamond Alkali Company, Cleveland, Ohio. Mr. Hayley started his career in the agricultural chemical field in 1928 as a salesman for Tobacco By-products and Chemical Corp. which later became a division of the Virginia-Carolina Chemical Corp., Richmond, Va., and more recently, a unit of Diamond.

•

Editors Award To Hyman

Theodore M. Hyman, extension radio and television editor, Division of Agricultural Information, North Carolina State College, Raleigh, last month was awarded the Agricultural Communications Award sponsored by the American Association of Agricultural College Editors and the National Plant Food Institute. The award was made at a special luncheon ceremony at the University of Wisconsin, Aug. 6.

•

Pesticide Cited In Senate

Pesticidal chemicals, dedicated to the never-ending battle of man against the ravages of nature, have changed the life of every one of us for the better, observed Senator Alexander Wiley of Wisconsin in remarks made in the U. S. Senate on July 17.

Senator Wiley's comments were made in conjunction with official recognition of the Silver Jubilee Meeting of the National Agricultural Chemicals Association in Augusta, Ga., Oct. 29 to 31. The senator observed that not only the American farmer, but the public as a whole, is deeply indebted to the miracles which have been wrought by chemical compounds as applied to agriculture.

•

Court Enjoins CFF Employe

Charles M. Miller, an employe of the Central Farmers Fertilizer Co., Chicago, last month was perpetually enjoined by the U.S. District Court in Salt Lake City, Utah, from "appropriation, use or revelation" of any trade secrets and other information and data he unlawfully took while an employe of the Monsanto Chemical Co., St Louis, Mo.

The court also found that the F.C. Torkelson Co., a Salt Lake City engineering firm and a defendant in the case, had wrongfully and unlawfully used Monsanto trade secrets revealed by Mr. Miller, but it did not grant an injunction against that firm.

The ruling climaxes action begun by Monsanto in December, 1956, against Mr. Miller and the Torkelson firm. Central Farmers Fertilizer Co. is a defendant in a companion suit in the U.S. Federal District Court at Pocatello, Idaho.

•

Phosphate Boosts Forage

Phosphate fertilizer applied in large amounts increases the yield of pasture forage, a recent study at Utah State University, Logan, indicates.

The research showed that the fertilizers continued to give increased response in pasture yields even when applied at rates as high as 800 pounds to the acre. The study was made by C. H. Mickelsen, G. Q. Bateman, L. D. Perkes, and Dr. G. E. Stoddard, all of the USU dairy industry department.

The trial will be continued at least one more year to determine the length of carry-over at the different levels of application tested.

•

Fulton Bag Names Two

Fred G. Barnet has been appointed vice-president in charge of marketing for the textile division of the Fulton Bag & Cotton Mills, Atlanta, Ga. At the same time, Lloyd O. Harris Jr. was named general manager of the textile division.

•

Livestock Test Farm

Dr. Joseph G. Brewer has opened a livestock test farm at Yellow House, Pa., 45 miles northwest of Philadelphia in Berks County.

He plans to work with cattle, calves, sheep, and swine along nutritional, toxicological, and other lines, for new product testing for industry under farm conditions. The farm is called the Berkshire Livestock Test Farm.

Younts Joins API

Dr. S. E. Younts, former research assistant professor of soils at the University of Maryland, has joined the American Potash Institute as agronomist for the eastern region serving the area from Virginia to Maine.

Dr. Younts' headquarters are in Washington, D.C.

•

Heads Procurement Dept.

The Agricultural Chemical Division of Swift & Co., Chicago, has named H. C. Huffman as head of its procurement department. Mr. Huffman is responsible for the purchase of plant food raw materials and will assist in the sale of phosphate rock and triple superphosphate at the company's Bartow, Fla., phosphate center.

Mr. Huffman joined Swift in 1928. During the past eleven years, he has assisted in general accounting for the Agricultural Chemical Division.

•

Selling Garden Supplies

Howard A. Weibel, manager of the Garden Chemicals Section of E. I. du Pont de Nemours & Co., Wilmington, spoke at the annual meeting of the North Carolina Seedsmen's Association at Blowing Rock, N. C., July 21. He described some trends in American living that make the garden market look promising and demonstrated basic methods of meeting customers' needs.

"We have found," he said, "in our own merchandising of chemicals for the home gardener that we are selling technical products to nontechnical people. To serve this market, to you have to interpret your professional knowledge to agriculture or horticulture in practical terms which the user of your product can apply to his own needs."

Pointing out that the first section of the merchandising bridge between technical know-how and a completed sale is to know the customer, Mr. Weibel reminded that, when competition gets keen, the profitable business goes to the fellow who has information about his market and knows how to use it.

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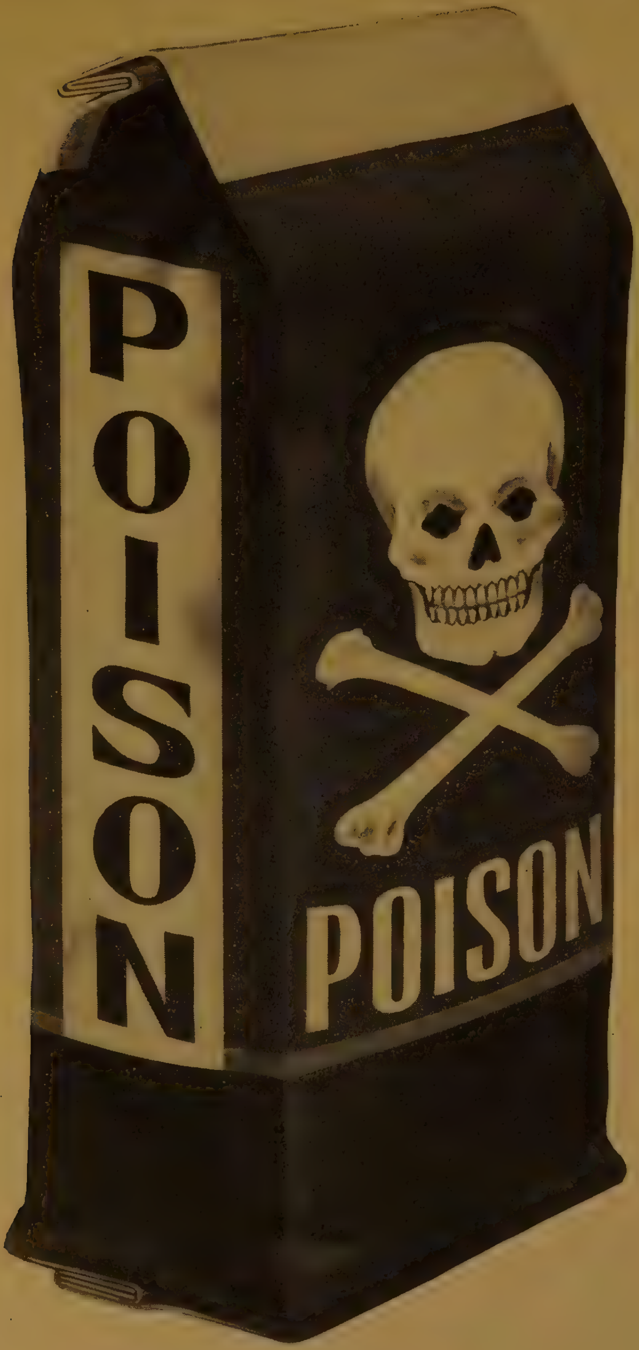

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Coope Retires From PCA

G. F. Coope, president of the Potash Company of America for the past 21 years, retired Aug. 1. He also retired from his position as president of the Potash Company of America, Ltd., the wholly-owned subsidiary of PCA at Saskatchewan, Canada.

Mr. Coope has been succeeded by F. O. Davis, who has been executive vice president and treasurer of the firm. In addition to heading PCA, Mr. Davis is president of PCA, Ltd. His former post of managing director of the Canadian subsidiary has been eliminated.

The new president joined PCA in 1936 as controller of the firm. Mr. Coope also had been with the company since 1936. He will remain on the firm's board of directors and the executive committee.

William H. Bartlett has been appointed treasurer of the company to succeed Mr. Davis.

•

Announce New Pesticides

Aagrunol Chemical Works, Groningen, Holland, has announced the development of a number of new pesticides that are appearing on the Dutch market and are being tested in other countries.

The firm has prepared folders for Aateck, a fungicide for fruit scab control; Aacuram, a fungicide; and methylmercurypentachlorophenolate compound 473, a seed disinfectant.

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Army Research Office

The Army Research Office is now located at Arlington Hall Station, Arlington, Va. The office was established in March of this year for the purpose of promoting and coordinating the Army research efforts with those of civilian scientists.

•

Wildlife Study Set

President Eisenhower last month signed legislation directing the Secretary of Interior to study the effects of insecticides, fungicides, and herbicides on Wildlife, fish, and natural resources.

The study will undertake to determine safe amounts of chemicals and other pesticides that may be used for a minimum loss of fish and wildlife.

•

Planning For Profits

Planning for profits is the theme of the 1958 convention of the National Fertilizer Solutions Association to be held at the Netherland Hilton Hotel in Cincinnati, Nov. 16 to 18.

A panel discussion is planned that will follow the convention theme, with speakers telling of production and inventory control, production equipment, application equipment, and standardization.

Chemico Names Two

Samuel Strelzoff has been appointed to the newly-created position of assistant to the president of the Chemical Construction Corp., New York. Mr. Strelzoff is responsible for technical development and sales of special projects on a world wide basis. He had been general sales manager of Chemico since 1954.

Replacing Mr. Strelzoff in that post will be David Fulton. Before joining Chemico, Mr. Fulton had served as sales manager of the Lummus Co., New York Division, and vice president of the Lummus Co., Canada Ltd.

S. Strelzoff

D. Fulton

Canadian Agricultural Chemicals Assn. Meets Sept. 15

THE annual meeting of the Canadian Agricultural Chemicals Association will be held September 15 to 17 at the Fort Garry Hotel in Winnipeg, Manitoba.

A symposium on new developments in agricultural chemicals will be a main feature of the meeting. New chemicals in weed control will be discussed by L. H. J. Shebeski, plant science division of the Faculty of Agriculture and Home Economics, University of Manitoba. W. B. Fox, director of technical development, Chipman Chemicals, Ltd., Winnipeg, will tell of some new developments in insecticides and Dr. W. E. Sackston, officer-in-charge, Botany & Plant Pathology Division, Science Service, Plant Pathology Laboratory, Fort Garry, will discuss new developments in fungicides and seed dressings.

D. M. McLean, director of the agricultural department of the Pioneer Grain Co. Ltd., will be chairman of a panel discussion on problems of the agricultural chemical industry. R. B. Marr, general manager of Naugatuck Chemicals Ltd., Elmira, Ontario, will represent manufacturers, and A. Lindenberg of Lindenberg Bros., Brandon, Manitoba, will speak for distributors on the panel. In addition, R. H. Painter, livestock insect liaison officer of the Canadian Department of Agriculture, Lethbridge, Alta., will represent the extension worker and E. L. Lawrence, Lillyfield, Man., will represent farmers.

An address entitled "The Western Farmer's Dilemma" will be given by Prof. J. D. Gilson of the University of Manitoba, Fort Garry..

J. Burke-Gaffney, Cockfield, Brown & Co. Ltd., Winnipeg, will talk on new and proven sales and advertising techniques applicable to agricultural chemicals. Weather forecasting and its application to agriculture will be the subject of a paper to be presented by Dr. B. M. Currie of the University of Saskatchewan, Saskatoon, Sask.

G. H. Nielsen, Canadian Petroleum Association, Calgary, Alta., will comment on the petrochemical industry in Western Canada and its relationship to agricultural chemicals.

J. H. Elliott, president of the Canadian Agricultural Chemicals Assn., will present a keynote address to open the meeting.

. . . Magic Yellow sewn

An ALL-NEW concept in valve construction . . . "DUETTE" is actually *two valves in one* with a DOUBLE CHECK ACTION. Thoroughly tested and proved siftproof, without packing trouble.

There's never been a sewn multiwall valve like it. It's NEW . . . not just another way of shaping, creasing, notching or slitting . . . but an *addition* that acts as a valve-on-a-valve, giving double sift protection.

Bemis "DUETTE" Valve Multiwalls, tested in full-scale production for over a year, have proved their superiority over other sleeve valve bags for a wide variety of products—granular, pelletized or pulverized.

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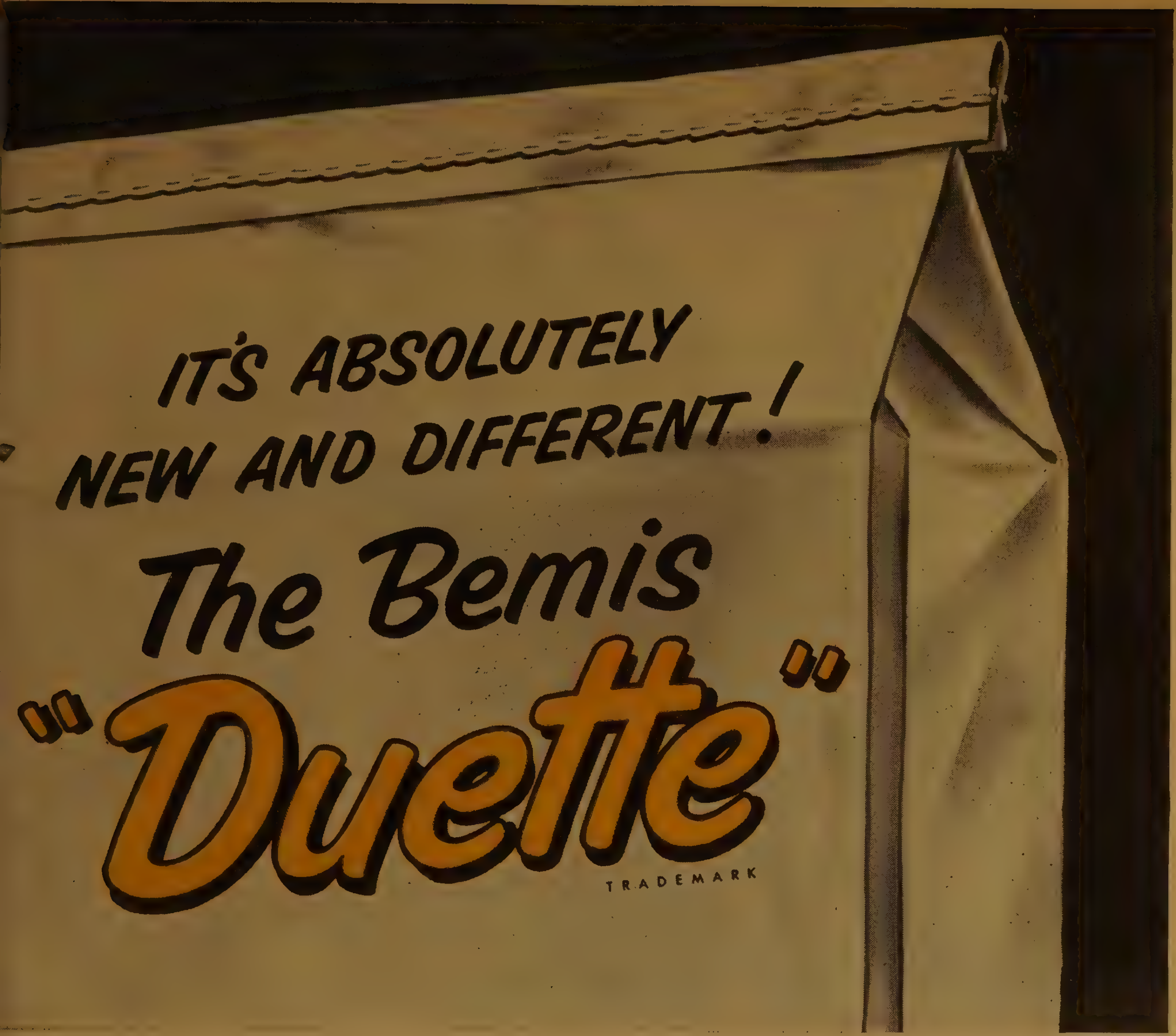
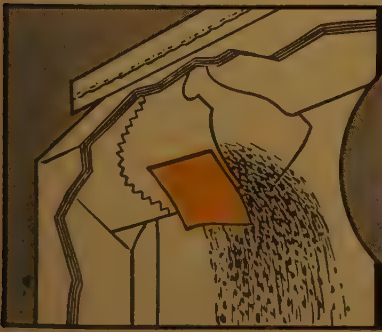
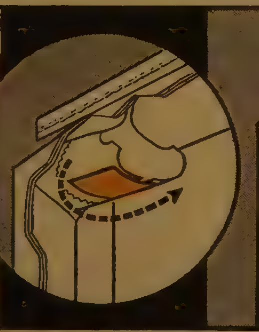


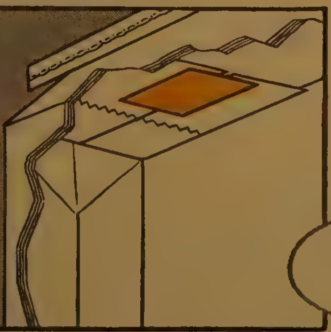
multiwall sleeve valve



WON'T CLOG . . . This view shows how the Magic Yellow check flap falls freely aside from the valve slit, giving no interference whatever to proper operation of the packing spout. The sleeve won't choke or clog the packer.



POSITIVE CLOSING ACTION . . . This diagrammatic picture shows action as the flap starts to close over the valve slit.



CAN'T SIFT . . . When the bag is filled, the Magic Yellow flap, acting as a check valve, *completely overlaps and covers* the valve slit, keeping the product from reaching the place where it might find a chance to sift.

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Two Join Best Co.

Eugene L. Knickrehm and Francis W. Johnson have joined the Best Fertilizers Co., Oakland, Calif., as ammonia department head and assistant for ammonia, respectively, in connection with Best's contract for the construction and operation of a California Ammonia Co. ammonia plant at Lathrop, Calif.

Mr. Knickrehm had been located at Whiting, Ind., with the Calumet Nitrogen Products Co., a subsidiary of Standard Oil of Indiana. He has had other ammonia plant experience with Spencer Chemical Co. and Grace Chemical Co.

Mr. Johnson has been plant superintendent in chemical plants of Carthage Hydrovol, Spencer, Grace, and Air Products, Inc.

•

Hidden Hunger Report

The American Potash Institute, Washington, D. C., has prepared a booklet on hidden hunger in crops. Featuring illustrated articles by several authorities in their fields, the 48-page handbook explains how various research tools can be used to guide farmers toward the most profitable yield levels.

The major articles, developed in semi-technical style, were written by the following authorities in modern fertilization practices:

A. L. Lang and Samuel R. Aldrich, University of Illinois soil scientists; Albert Ulrich, University of California plant physiologist; W. D. Bishop, University of Tennessee Extension Agronomy head; R. E. Blaser, C. Y. Ward, and W. W. Moschler, Virginia Agricultuural Experiment Station agronomists; Gordon B. Nance, agricultural economist, and John Falloon, soils specialist of the University of Missouri, and T. L. Jackson, Oregon State College soil scientist.

The booklet explains what hidden hunger is and what diagnostic tools should be used to conquer it. It explains how field experiments point ways to top yields, how plant analysis can prevent crop hunger, how soil tests can be used to isolate and build up low-producing areas.

It discusses how hidden hunger in grasses and legumes can often be detected by fertilizer responses in the area between actual hunger signs and highest possible yield. And it covers the economic factors that help determine yield goals and the most profitable fertilizer treatments.

It is free through the American Potash Institute News Service, 1102 16th St., N.W., Washington 6, D.C.

Scott Leases Port Space

O. M. Scott & Sons, Marysville, Ohio, has leased space in a four-million dollar cargo distribution center on the south side of Port Newark (New Jersey). The company will employ 40 persons.

Scott, which does about 20-million dollars worth of business a year, will use the new building for storage and distribution of grass seed, weed killer, fertilizer, packaged bulbs, seeds, and electric mowers. Much of the company's production depends on imports from New Zealand and Europe on trade routes served by Port Newark's new Norton, Lilly Terminal.

Balfour Heads Pyrethrum Sales

Appointment of Balfour, Guthrie & Co., Ltd., to service sales of African pyrethrum to the United States, effective immediately, is announced by the three separate groups of African growers. Balfour, Guthrie will act through its American corporation of the same name.

The African groups are: (1) The Pyrethrum Board of Kenya, (2) The Pyrethrum Board of Tanganyika, and (3) Societe Cooperative des Produits Agricoles (SOCOPA), of the Belgian Congo.

H. Alvin Smith, an advisor to the African growers, said this appointment completes a new program for handling American sales of pyrethrum.

"The new program," Mr. Smith said, "will bring into closer relationship the African pyrethrum growers and the American formulators of pyrethrum insecticides, in whose hands rests the ultimate growth of pyrethrum sales. A delegation representing African producers is expected to visit the United States in September to put into maximum effect this program of enhanced cooperation."

Service operations by Balfour, Guthrie are defined as relating only to servicing shipments, deliveries, sampling, analysis and similar matters in connection with sales of dried flowers and/or extracted pyrethrins—the active agency in the pyrethrum bloom—as well as matters relating to claims.

All negotiations concerning sales will be on a direct basis between the American buyers and African purveyors. African sales will be made for the present by the Pyrethrum Board of Kenya, of which Norman H. Hardy is executive officer.

Mr. Smith, former president of John Powell Company, prior to its sale to Olin Mathieson Co., Inc., and long identified with development of the pyrethrum market in the United States, will continue as advisor on American activities.

The African boards will continue an American promotion program, begun in 1955, for the publicizing of new developments in the application and use of this natural insecticide, noted for its quick knockdown of insects, its non-immunity factors, and its safety for human beings and animal life.

For many years the bulk of African pyrethrum imports have been in the form of dried flowers. However, this balance is expected to shift in the near future with the opening of grower-owned extraction plants in Kenya and the Congo, to supplement two privately owned plants already operating in these states.

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Fertilizer Plant in Trinidad

The International Cooperation Administration last month announced the signing of the largest investment guaranty contract in the history of this ICA program to encourage and facilitate United States private investment abroad.

The contract, with W. R. Grace & Co., New York, assures that company of convertibility into dollars of up to $17,750,000 from American private investments in a new chemical fertilizer plant which it will erect and operate in Trinidad. In addition to the U.S. funds, British capital also will participate in the new company, known as Federation Chemicals Ltd.

The company will manufacture chemical fertilizers and allied products in Trinidad for sale in the Caribbean area, South America, and other parts of the world. Federation Chemicals Ltd. plans to establish an ammonia plant, a sulphuric acid plant, an ammonium sulphate plant, a urea plant, and various off-site facilities in Trinidad. The industry will utilize available Trinidad labor and basic local raw materials in the form of hydrocarbons found in the natural gas supplies presently lost through the flaring operations of local refineries.

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Range Fertilizer Conf.

More than 300 persons are expected to attend the Western Range Fertilization Conference, to be held at Riverview Country Club, Redding, Calif., Oct. 27. Attendance will be from 11 western states.

This conference will precede the annual meeting of the California chapter of the American Society of Range Management, which will be held at the same place Oct. 28 and 29. The society is cooperating in the range conference and its president, Dr. R. Merton Love, professor of agronomy, University of California, Davis, will present the principal address following a dinner. William G. Hewitt, president of the California Fertilizer Assn. and a director of the National Plant Food Institute, will be chairman of the range fertilization conference.

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Connecticut Field Day

An exhibit by analytical chemists at the annual Field Day of the Connecticut Agricultural Experiment Station, Aug. 16, at Mt. Carmel, Conn., demonstrated how the station samples and analyzes fertilizer samples. The exhibit, featuring colored slides and a recorded commentary, was one of many prepared by staff members.

The exhibits were held at the Lockwood Experimental Farm of the station in Mt. Carmel and were under the general direction of W. Theodore Brigham.

The biochemistry laboratory exhibit showed the method used in isolation of a new synthetic sugar in leaves. Soils experts demonstrated sampling techniques and physical analysis procedures.

A series of color slides on woodland succession comprised the forestry exhibit. Plant pathologists demonstrated how environment affects plant constituents, and how they find nematodes in and on plant roots.

The tobacco laboratory presented potato and tobacco root-growth findings, information on deep tillage, and on weed control. A method of studying long-range effects of insecticides on house fly populations also was demonstrated.

The field day began at 10 a.m. and continued throughout the day. Richard Bradfield of Cornell University was the principal speaker of the day and spoke on scientific research and the agriculture of the future. Field day guests were invited to visit experiment farm plots not included in the regular tours. All regular tours were conducted by staff members who explained the field investigations in detail at each stop. The farm is a 61-acre tract, acquired in six parcels over 43 years with income from the William R. Lockwood Trust Fund, of which the station is beneficiary.

To Build In Africa

Fisons Pest Control Ltd., London, has announced the completion of arrangements with the Industrial Development Corp., Commonwealth Development Finance Co., and the Industrial Finance Corp. of South Africa regarding partial financing of the company's new factory at Sasolburg.

The factory, which will be completed next year, will produce sulphuric acid, superphosphate, and compound fertilizers. Fisons and Albatros Superfosfaat, of Holland, are principal shareholders of the South African Fisons Co., which has factories at Durban and Cape Town.

•

T. Tertius Aikman Retires

T. Tertius Aikman has retired as chairman of Aikman (London) Ltd. but will remain as consultant to the company.. The new chairman is Barry T. Aikman, Mr. Aikman's son. Mrs. Winifred Aikman, Mr. Aikman's wife, also is retiring from the board.

The company started in Glasgow in 1830 by Tertius Aikman's grandfather. It is noted for its half-yearly reports on nitrogen.

•

Herbicide Reports

Harley Otto and William Hueg, extension agronomists at the University of Minnesota, St. Paul, have reported that either 2,4-D or MCP will control "Yellow Rocket" if the weed shows up in grain or corn fields. They warn, however, that crop injury may result if either chemical is used in legume fields.

The only time yellow rocket can be controlled chemically in alfalfa or other legumes is when the crop is dormant, in early spring. Recommendations for control in the summer are: In corn, barley, or wheat, spray with a half pound of 2,4-D per acre, using the amine form of the chemical. In flax, MCP should be used at one-half pound per acre. In oats, either chemical may be used at the half-pound rate, but MCP is better because it is less likely to injure the crop.

AGRICULTURAL Chemicals

OCTOBER NACA CONVENTION ISSUE

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ISSUE OF AGRICULTURAL CHEMICALS

- The October issue of AGRICULTURAL CHEMICALS will be distributed to those attending the National Agricultural Chemicals Association annual convention at the General Oglethorpe Hotel in Savannah, Georgia, October 29 to 31.

- The complete convention program and other special editorial features will appear in this important convention issue.

- Take advantage of the extra convention circulation — with no increase in advertising rates — by scheduling a dominant advertisement in this issue.

- Advertising deadline for October is September 10.

AGRICULTURAL CHEMICALS

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National Plant Food Institute Program In Full Swing

Soil testing projects, Fertilizer demonstrations, Farmer meetings, College grants . . . are among NPFI regional activities in expanded program designed to sell the farmer on increased fertilizer use.

In the Midwest . . .

MEMBERS of the Midwest Regional Advisory Committee of the national Plant Food Institute reviewed plans for expanded educational activities and approved the proposed budget for the year ending June 30, 1959, at a meeting July 22 at the Builders Club in Chicago.

NPFI President R. E. Bennett, who is also chairman of the Regional Committee, presided.

Among projects approved by the committee were:

- County-wide projects to measure the impact of soil testing and fertilizer demonstrations on the use of fertilizer, and the attitudes of people toward the use of fertilizer. These studies will also include a survey of dealers and their attitudes toward fertilizer. The studies will be made in as many states as the available funds will cover.
- Grants-in-aid for fertilizer research projects in Indiana, Kentucky and Michigan, also support for fertilizer demonstrations in Wisconsin.
- Funds for an NPFI scholarship program in seven Midwestern states, to recognize superior students in soils or crops at the agricultural colleges.
- Continuance of the educational news service to 1,700 daily and weekly newspapers and 375 radio and TV stations in the region.
- Printing and production of "Crop Potential Wall Charts and Check Lists" for four more states to supplement the program already under way in Illinois and Wisconsin.
- Cooperative projects with state banking associations in 13 Midwestern states.
- Expansion of the February joint meeting of college agronomists and fertilizer industry men. A proposed addition is a discussion between extension agronomists and 4-H Club project leaders in the 13 states, with the purpose of strengthening the soils and fertility aspects of the 4-H Club projects in the area.

Zenas H. Beers, midwest regional director, reported that two new district representatives have been employed. These are Arlan Woltemath, who will work in the states of Kansas, Missouri, Nebraska and Iowa; and John Guttay, who will cover Michigan, Ohio, Indiana and Kentucky.

The Institute is now in the process of obtaining a third representative who will work out of St. Paul, covering Minnesota, Wisconsin, North and South Dakota, Mr. Beers said.

Attending the meeting were: W. R. Allstetter, NPFI vice president; R. E. Bennett; Z. H. Beers; Merle Blue, Consumers Cooperative Association; R. G. Fitzgerald, Smith-Douglass Co.; Frank Nelson, Rath Packing Co.; A. C. Norris, V. W. Norris & Son; E. T. Potterton, International Minerals and Chemical Corp.; and W. W. Venable, Cornland Manufacturing Corp.

Research Committee Chairman

R. P. Thomas, International Minerals & Chemical Corp., was elected chairman of the National Plant Food Institute's Midwest Research and Education Committee at a meeting at the Builders' Club in Chicago July 11. Zenas H. Beers, NPFI Midwest Regional Director was named secretary of the group.

Mr. Thomas was also selected as the committee's representative on the National Steering Committee. Leo Orth, Sinclair Chemicals, Inc., was named alternate.

During the meeting, W. R. Allstetter, NPFI Vice President, outlined the functions and organization of the various regional research committees and their work in developing programs adapted to the needs of their regions.

Committee members reviewed NPFI-sponsored fertilizer research projects at various Midwestern agricultural colleges and experiment stations. The committee authorized Chairman Thomas to name a special committee to serve as a work group on these projects, cooperating with the research men at the various colleges.

Dr. S. L. Aldrich, University of Illinois extension agronomist, discussed with the committee an idea for a proposed study of the degree and source of segregation in bulk spreading of fertilizer.

The committee authorized the chairman to appoint two other special work groups from its membership. Their functions will be, respectively: (1) To study possibility of a pilot soil testing project in the Midwest region. The project's purpose would be to encourage soil testing and also, to use the project to measure the effectiveness of soil testing as a tool for merchandising fertilizer, (2) To study fertilizer demonstration programs and determine the effectiveness of demonstrations as a means of merchandising fertilizer.

Attending the meeting were: Messrs. Allstetter and Beers; W. T. Dible, International Minerals & Chemical Corp.; Dale Friday,

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NPFI News Cont.

Nitrogen Division, Allied Chemical Corp.; Proctor Gull, Spencer Chemical Co.; Hartl Lucks, Smith Agricultural Chemical Co.; Werner Nelson, American Potash Institute; Leo Orth; Leonard Schrader, Standard Oil Co.; C. L. W. Swanson, The Texas Co.; R. P. Thomas; and H. H. Tucker, Sohio Chemical Co.

Minnesota Tour

A Minnesota pasture fertilization tour for fertilizer salesmen, dealers, industry agronomists and other interested presonnel was held Aug. 27-28.

The tour was conducted by University staff members, including Dr. Lowell Hanson, extension soils specialist; Dr. Ermond H. Hartmans, extension farm management specialist; and William F. Hueg, extension agronomist.

Tour members visited five farms in Southeastern Minnesota, where pasture fertilization and management demonstrations are in progress.

The demonstration program in 11 Southeastern and Northern Minnesota counties is being supported by a National Plant Food Institute grant this year.

The tour opened a briefing session, when university men described how the plots are laid out, the fertilization program, the pasture crop on each farm, grazing, management and results thus far.

Speakers included: Roland Abraham, assistant director, Minnesota Agricultural Extension Service; Dr. Hanson, Dr. Hartmans and Prof. Hueg. Zenas H. Beers, NPFI Midwest director discussed the demonstrations in relation to the NPFI.

Research at Purdue

Purdue University agricultural economists, agronomists and agricultural engineers are cooperating in research on crop response to fertilizer under irrigation. The studies are being supported in part, by a grant from the National Plant Food Institute.

Cooperating in the research program are Dr. D. Wood Thomas, and LaVon Smith, Agricultural Economics Department; and Dan Wiersma, Agronomy Department. The Agricultural Engineering Department will name a staff member on the project to succeed John R. Davis, who has left the University.

The research men are seeking answers to the problems of: (1) The least costly combination inputs of water, seed and nitrogen, phosphate and potash fertilizer to producing desired crop output levels, and (2) the most profitable level of applications of such inputs under various product price relationships.

One phase of the research program deals with 1957 tests with irrigated corn grown on Plainfield fine sand at the Purdue University farm at Culver, Ind.

Agricultural economists are now analyzing and correlating information summarizing the results of last summer's field work.

The 1957 field experiments included eight levels of nitrogen application, four levels of water application and four levels of plant population.

Corn yields varied greatly under the several combinations of water, nitrogen and plant population. Yields ran as high as 169 bushels per acre under high levels of water application, moderate levels of nitrogen application and plant population, the field tests indicated. Yields were as low as 10 to 12 bushels per acre on plots with no additional irrigation, no nitrogen and low plant populations.

As a result of the agricultural economists' analysis of the data, it may be possible to specifiy the most profitable combinations of water, nitrogen and plant population to use in producing corn on Plainfield fine sand, under various price-cost relationships, according to Dr. Thomas.

In the West . . .

Farm Advisors School

A two-day Farm Advisors Fertilizer Technology School, sponsored jointly by the National Plant Food Institute and the Agricultural Extension Service of the University of California, opens on Sept. 16 at Giannini Hall on the Berkeley campus.

The agenda for the school was planned by Dr. Richard Bahme, Western Regional Director for the Institute, and Dr. W. E. Martin, Extension Soils Specialist of the Agricultural Extension Service at the University.

Participants in the school will meet at Giannini Hall Sept. 16 for instruction on phosphate chemistry and production. The remainder of the day's activities include the following: 1:00 p.m., meet at Stauffer Chemical Co. in Richmond to view sulfuric acid and superphosphate production; 2:30 p.m., depart for Hercules Powder Co. installation at Pinole to observe ammonia and urea manufacturing facilities, and 6:30 p.m., dinner meeting at Spenger's Restaurant in Berkeley. The dinner will be sponsored by those chemical companies whose plants will be visited on the tour. The evening program will consist of educational movies of potash and phosphate mining and production, and a presentation by Dr. Bahme on the Institute's study on "Farmers' Attitudes Toward the Use of Fertilizer in the West."

The second day's program will open in Giannini Hall where the farm advisors will receive instruction on nitrogen chemistry and production. The group will leave

(*Continued on Page* 98)

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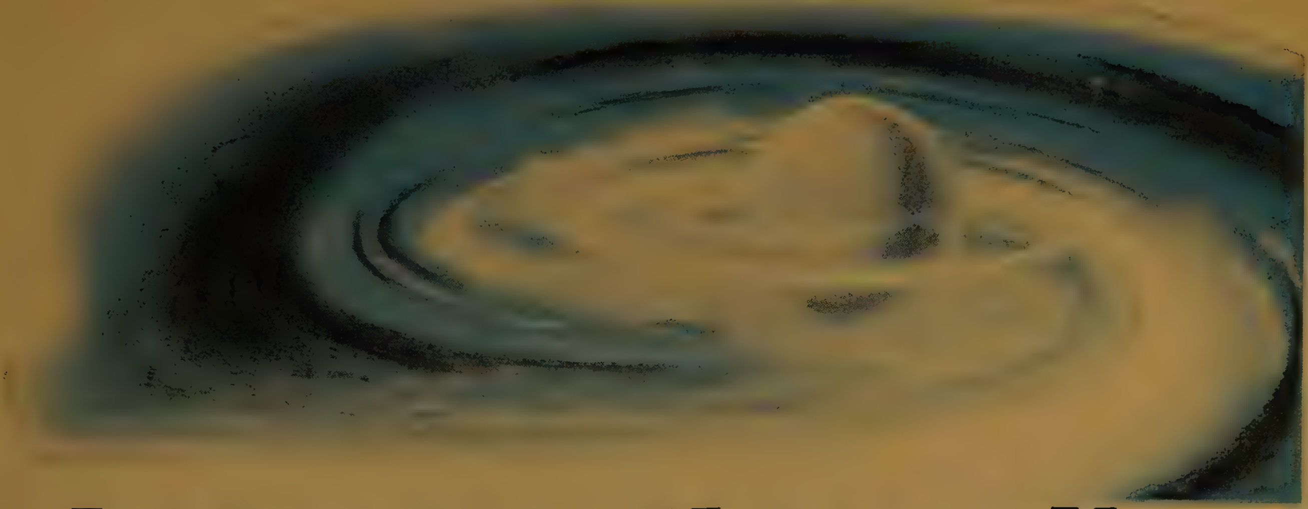

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Fertilizer Grades Reviewed at Texas Meeting

FERTILIZER manufacturers, state control officials from Arkansas, Louisiana, Mississippi, New Mexico, Oklahoma and Texas, plus basic material producers from all points of the nation coverged for the thirty-third annual Southwestern Fertilizer Conference and Grade Hearing held at the Buccaneer Hotel Galveston, Texas, July 16-19. Attendance exceeded 300.

Stanley Hackett, president of Dixie Fertilizer Company, Shreveport, Louisiana, was chairman of the business session July 17. Dr. Russell Coleman, executive vice-president of the National Plant Food Institute, commented on NPFI's study on "Farmers Attitudes Toward the Use of Fertilizer" and introduced Dr. Robert L. Beacher, NPFI Southwest Regional Director, who observed that NPFI accomplishments and plans include a county promotion program, an undertaking of working with bankers, and a demonstration visitation project. Mr. Beacher mentioned that the county promotion which is scheduled to get under way this fall will be based on soil testing and will be located in one parish in Louisiana, one county in east Texas and two counties in Arkansas. This project is aimed at testing every farm in the particular county or parish within a 12-month period. The demonstration visitation program, Beacher added, is being set up to help attract more farmers and fertilizer salesmen to demonstrations being conducted by colleges in the southwest. Mr. Beacher also mentioned that NPFI plans to revise its southwestern research projects in order to develop better information on the economic returns from fertilization under different moisture conditions.

Dr. J. F. Fudge, state chemist, Texas A & M, presided over the Southwestern Annual Grade Hearing July 18. Dr. Lyell Thompson, University of Arkansas represented Arkansas and Mr. Park Yeates, Director of Feed & Fertilizer Division for Oklahoma mentioned Oklahoma was going to higher minimum grades. Dr. M. B. Sturgis, Head of Agronomy Dept., Louisiana State University, spoke for Louisiana. Dr. Sturgis pointed out that 6-12-6 would be the minimum grade in the 1-2-1 ratio for Louisiana in 1959. He stated that while the total fertilizer tonnage was off 14% in 1957-1958 in Louisiana, the plant food units were off only 10%. Dr. Sturgis mentioned their new fertilizer booklet No. 51 printed in January 1958

entitled "General Fertilizer Recommendations for Louisiana." This publication lists the nitrogen, phosphorus and potash recommendations for cotton, corn, oats, rice, sugar cane, peanuts, soybeans, lespedeza and allied pasture crops, all types of fruits and vegetables grown in Louisiana. It is comprehensive and valuable information for the farmer and fertilizer manufacturers. There was a lively discussion by the Southwestern group on the possibility of dropping 5-10-5 and making 6-12-6 the minimum grade.

The 1959 meeting will be at the Galvez Hotel, Galveston, Texas, July 15, 16, 17 & 18.

Captions for Pictures

1st row:
G. E. Magee, Lone Star Bag Co.; Ned Halderman, Spencer Chem. Co.; W. G. Fullick, Lone Star Bag Co.; Archie Edwards, Red Star Fert. Co.; Jim Norwood, Allied Chemical.

Jack Lindsey, IM&CC Shreveport, introduces convention speaker Clayton Rand.

2nd row:
Pete Stultz, Caprock Fert. Co., Littlefield, Tex.; Vance Hancock, Dixie Fert. Co.

Joe Wright, Texas Farm Products Co. and W. S. Tyler, Longhorn Construction Co.

3rd row:
Stanley Hackett, Dixie Fert. Co.; Bill Crady, U.S. Potash Co.; Bob Linderman, IM&CC; and Dick Goldthwaite, Monsanto Chem. Co.

4th row:
Bill Brashear, National Potash Co.; Bill Young, AP&C; Bill Porterfield, U.S. Potash Co.; and Jimmy Powledge, National Hotel Co.

H. E. Graham, Ft. Smith Cotton Oil; Buddy Stewart, Ark-Mo.; Jce Craighead, Swift & Co.; J. G. Woods, Miss. River Chem. Co.; L. G. Black, Ark.-Mo.; Bob Fisackerly, Miss. Chem. Corp.

•

Hansen Joins Davey Co.

Dr. Carl O. Hansen has joined the Davey Tree Expert Co., Kent, Ohio, as a research and extension worker and advisor on tree care problems for the firm's technical service center.

Dr. Hansen's duties will center chiefly in the field of tree insect problems and diseases.

Ketona Expansion Program

P. H. Neal, president of Ketona Chemical Corp., Ketona, Alabama, announced a new expansion program which will include the construction of facilities at Ketona to produce two solid nitrogen products, prilled ammonium nitrate and ammonium nitrate-limestone.

The Chemical and Industrial Corp., Cincinnati, has been awarded the contract to design, engineer and construct this latest addition at Ketona, which is expected to be completed early in 1959. The ammonium nitrate and ammonium nitrate-limestone will be produced by a new C&I process which forms spherical particles with superior storage and handling properties.

Ketona Chemical is jointly owned by Alabama By-Products Corp., Birmingham, Alabama, and Hercules Powder Co., Wilmington, Delaware.

•

NATA Meeting Nov. 11

The National Aviation Trades Association will hold its annual meeting at the Pfister Hotel in Milwaukee, Wis., Nov. 11 through 14.

•

Yugoslav Fertilizer Plant

Work began recently on a nitrate plant which is being built with Russian technical assistance and credits at Pancevo, Yugoslavia, near Belgrade.

•

Shell Names Two

G. S. Willliamson and Frank G. Watson have been named by the Shell Chemical Corp., New York, to manage two of the company's California plants.

Mr. Williamson, formerly manager of the ammonia plant at Pittsburgh, Calif., now is manager of the company's synthetic rubber plant at Torrance. Mr. Watson, former assistant manager of the firm's manufacturing development department in New York, succeeds Mr. Williamson at Pittsburgh.

American Chemical To Build

The Richfield Oil Corp. of Los Angeles and the Stauffer Chemical Co. of New York have announced that their jointly owned subsidiary, American Chemical Corp., is actively planning construction of a plant for the production of chlorinated hydrocarbons.

Present plans call for location of the petrochemical plant in Southern California.

•

Jones Rejoins Carbide

Hugh Jones has completed a tour of active duty with the U.S. Army and has returned to the White Plains, N. Y., office of Crag Carbide Chemicals Co., division of Union Carbide Corp.

He is working primarily on the development of Crag Sevin.

•

O.K. New Uses for Mylone

The U.S. Department of Agriculture has accepted labeling for Mylone soil fumigant covering applications on any kind of vegetable seed bed, ornamental propagating bed, turf preplanting bed, or forest tree seed bed, according to the Union Carbide Chemicals Company, Division of Union Carbide Corp., New York.

•

CFA Meets At Murray Bay

The 1958 convention of the Canadian Fertilizer Association was held at Murray Bay, Quebec, August 20 to 24.

Agricultural implications of the St. Lawrence seaway were discussed by Dr. E. G. Pleva of Western University, London, Ontario, and the use and potential of fertilizer in Quebec was the subject of a paper by Dr. G. J. Ouelette, Ste. Anne de la Pocatiere P.Q.

Dr. Russell Coleman of the National Plant Food Institute presented the results of a recent survey into fertilizer buying habits in the United States. Dr. G. R. Smith of Truro, Nova Scotia, told of grasslands and fertilizers in the Maritimes. C. R. Phillips and C. L. Stevenson discussed new fertilizer acts and regulations.

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Ammonia plant start-up operations are virtually a matter of "push-button" routine with Chemico; for Chemico has designed and constructed more than 50 ammonia plants in the last 40 years.

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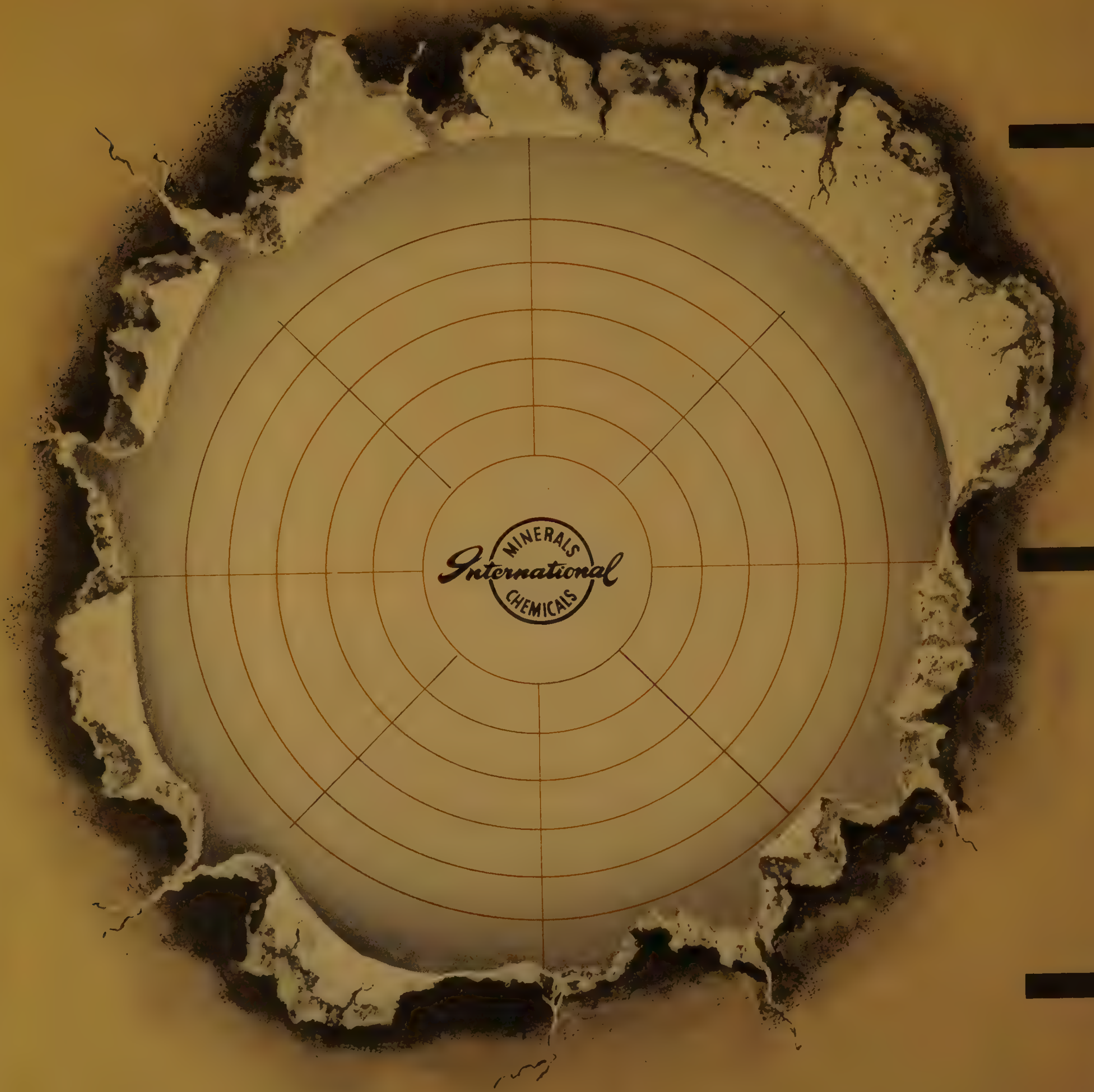

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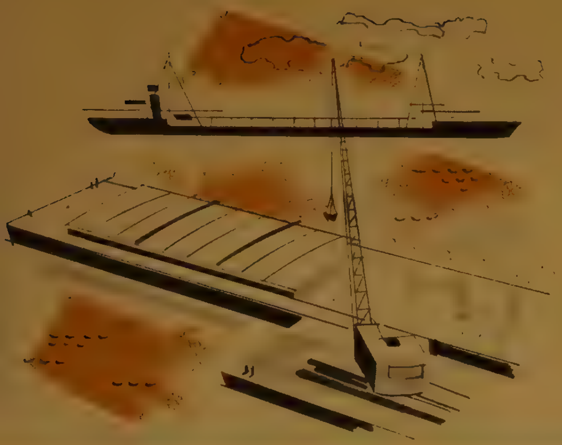

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International's research continually works for you — develops phosphate products with superior quality . . . a never-ending search for pure, high analysis—the texture and mixing characteristics consistent with your needs and profit structure.

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Experienced technicians bring practical solutions to production and formulation problems . . . every International Minerals man—scientific, technical or service—is on tap to give you on-location assistance at the cost of a call.

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RUN-OF-PILE — International's fine-textured Triple provides uniform particle size, even density and proper moisture level that lets you ammoniate at higher rates and temperatures.

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International's wet-process phosphoric acid works wonders where formulation costs are out of line . . . keeps high grades on the low side of cost control. Specifications: 53-55% P_2O_5; suspended solids, 2.5% by weight, max.; specific gravity (60° F) 1.70-1.75. And International's dependable fleet of rubber-lined tank cars puts rush shipments plant-side quickly to keep peak season schedules humming. And if you need technical assistance with production or planning installations, International Minerals' experienced and skilled technicians are on tap for on-the-spot trouble shooting.

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Screwworm Eradication Gains

Only two cases of screwworms in livestock have been reported this year through August 13 in the southeastern United States north of the Florida State line, according to a report by veterinarians of the U.S. Department of Agriculture and the State of Florida.

They attributed the unusually low incidence of screwworms in the Southeast this summer to (1) the cold winter weather of 1957-58, which greatly reduced populations of this insect, and (2) the head-start gained for the planned 1958 eradication program by limited release of sterilized male screwworm flies in north Florida and south Georgia, ahead of schedule, which helped prevent the pest's northward movement this spring.

•

Hazardous Materials Book

Chemical Specialties Manufacturers Association, New York, has just completed the "Compilation of Labeling Laws and Regulations for Hazardous Substances," in a 114-page book covering laws of 16 states and cities. The book was prepared by John D. Conner and R. L. Ackerly in cooperation with the CSMA executive staff.

•

Escambia Names Sutherland

Dr. L. Sutherland has been appointed assistant director of research for the Escambia Chemical Corp., New York.

Dr. Sutherland is located at Escambia's new research center at Wilton, Conn. He joined Escambia in 1956 as group leader in the research department and served as section head prior to his new appoitment.

•

Hooker Phosphorus Division

The Hooker Chemical Corp., Niagara Falls, N. Y., has established a Phosphorous Division with the four plants formerly operated by the Shea Chemical Corp. which merged into Hooker in May. The plants are located at Adams, Mass.; Columbia, Tenn.; Jeffersonville, Ind.; and Dallas, Tex.

Industry Meeting Calendar

Sept. 15-17 Canadian Agricultural Chemicals Assn., Fort Garry Hotel, Winnipeg, Manitoba, Canada.

Sept. 24—New England Fertilizer Conf., Melvin Village, N. H.

Oct. 13—Agricultural Research Institute, Panel on Problems Related to Agriculture in the Fertilizer Producing Industry. Academy of Sciences Building, Washington, D. C.

Oct. 14-15 — Western Agricultural Chemicals Association Annual Meeting, Villa Hotel, San Mateo, Calif.

Oct. 16—National Plant Food Institute Conference on Chemical Control Problems. Shoreham Hotel, Washington, D. C.

Oct. 17—Association of American Fertilizer Control Officials, Shoreham Hotel, Washington, D. C.

Oct. 20-24 — Farm Safety Sessions, 46th National Safety Congress and Exposition, Hamilton Hotel, Chicago.

Oct. 20 — Annual Sales Clinic of Salesmen's Assn. of the American Chemical Industry, Inc., Roosevelt Hotel, New York.

Oct. 22-24—Pacific Northwest Plant Food Assn., Gearhart, Oregon.

Oct. 28-29—Northwest Garden Supply Trade Show sponsored by the Oregon Feed and Seed Dealers Assn., Portland, Oregon.

Oct. 29-31 — National Agricultural Chemicals Association, General Oglethorpe Hotel, Savannah, Ga.

Oct. 29-31 — Eighth annual meeting of the Entomological Society of Canada and the 95th annual meeting of the Entomological Society of Ontario, Guelph, Ontario.

Oct. 30 — Southeastern Fertilizer Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Nov. 5-7—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 9-10 — California Fertilizer Assn. 35th Annual Convention, Ambassador Hotel, Los Angeles.

Nov. 10-11—Agricultural Aviation Research Conf., Milwaukee, Wisc.

Nov. 11-13—20th Annual New York State Insecticide and Fungicide Conference and 11th Annual Pesticide Application Equipment Conference, Bibbins Hall. Cornell University, Ithaca, N. Y.

Nov. 11-14—Annual Meeting, National Aviation Trades Assn., Pfister Hotel, Milwaukee, Wisc.

Nov. 13-14 — Canadian Chemical Specialties Manufacturers, Queen Elizabeth Hotel, Montreal.

Nov. 16-18—National Fertilizer Solutions Assn., Netherland Hilton Hotel, Cincinnati, Ohio.

Nov. 19-20—Annual Meeting, Carolinas-Virginia Pesticide Formulators Assn., Carolina Hotel, Pinehurst, N. C.

Nov. 24-25—Eastern Branch, Entomological Society of America, Lord Baltimore Hotel, Baltimore.

Dec. 1-4—Entomological Society of America, Sixth Annual Meeting, Hotel Utah, Salt Lake City, Utah.

Dec. 3-4—North Central Weed Control Conference, Netherland Hilton Hotel, Cincinnati.

Dec. 3-5 — Agricultural Ammonia Institute, Annual Meeting, Morrison Hotel, Chicago.

Dec. 9-11—Chemical Specialties Manufacturers Assn., Annual Meeting, Commodore Hotel, New York.

Dec. 17-18 — Beltwide Cotton Production Conf., Rice Hotel, Houston, Texas.

Dec. 26-30—American Association for the Advancement of Science, 125th Annual Meeting, Washington, D. C.

Jan. 20-22, 1959 — California Weed Conference, Santa Barbara, Cal.

•

35 Contribute To 4-H Work

Thirty-five companies had contributed to the work of the National 4-H Club Foundation as of Mid-August, according to R. E. Bennett, president of Farm Fertilizers, Inc.

Mr. Bennett, who also is president of the National Plant Food Institute, served as fertilizer industry chairman for a fund raising program in behalf of the 4-H Foundation. The program was begun in June and ended last month. Mr. Bennett said that the program was not only worth while, but was of significant value in expanding the over-all public relations of the fertilizer industry.

Stern Is Assistant To V.P.

J. D. Stern has been appointed assistant to the vice president of the Pacific Coast Borax Co. Division of the United States Borax & Chemical Corp., Los Angeles.

Mr. Stern, who was formerly assistant to the general manager, has been with the company for six years. His headquarters are in New York.

•

Greek Fertilizer Plant

The Government of Greece has named the Italian company, Ammonia Casale, and the Ude firm of Germany to construct a fertilizer plant at Ptolemais, site of the Bodossakis lignite mines. The mines will provide the nitrate plant exclusively with locally produced fuel.

Capacity of the plant will be 75,000 unit tons of nitrates annually, equal to 350,000 tons of fertilizers. This quantity will more than cover current Greek requirements.

The U.S. Development Loan Fund will advance $12 million toward the cost of the project.

•

Develop Bird Repellents

At the quarterly meeting of the board of managers of the New Jersey Agricultural Experiment Station, held in New Brunswick, N. J., Aug. 12, Dr. Ordway Starnes described several of 26 new research projects which have been started this year.

The research projects include work on developing repellents for redwing blackbirds, cowbirds, and grackles which cause an estimated crop damage of $5 million in New Jersey annually.

Also at the managers meeting, Ernest C. Bell, president of the board, called for increased attention to mosquito control in inland counties. He pointed out that new road construction has increased the mosquito nuisance throughout the state.

Manley Heads Advertising

Fred A. Manley has been named director of advertising and sales promotion for the agricultural division of Chas. Pfizer & Co., Brooklyn. Mr. Manley became sales promotion manager of Pfizer's agricultural division a year ago.

•

Central Farmers To Build

The H. K. Ferguson Co., engineering subsidiary of Morrison-Knudsen Construction Co., Boise, Idaho, has been named designer engineer on the elemental phosphorus furnace being built by the Central Farmers Fertilizer Co. at Georgetown Canyon, Idaho.

•

Named Morea Distributor

The Central Fertilizer and Chemical Co., Moses Lake, Wash., has been appointed as a mixer-distributor of Morea liquid supplement for ruminant animals by the U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., N. Y.

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Review of Developments in Fertilizer Industry

A number of important changes and developments in the fertilizer industry in the United States were analyzed in a paper presented at a joint session of the American Farm Economic Association and the Canadian Agricultural Economics Society at Winnipeg, Canada, August 20th, by E. L. Baum and S. L. Clement of the Tennessee Valley Authority. They called attention particularly to the spectacular increase in consumption of fertilizers in the West North Central States, where plant nutrient consumption has expanded four hundred per cent in the past ten years.

Nitrogen, they emphasized, is a very rapidly expanding branch of the fertilizer industry, which has been aided materially by the encouragement which the government has given to expansion in the form of preferential tax status, as well as the technological advances of the past ten years. "The shortage of labor engendered by the war, improvements in farm machinery, recognition by farmers that they must become more efficient in production, the lowered costs of fertilizers relative to other factors of production, and improved knowledge among farmers of the effects on yields of nitrogen applications along with a quick return on investment, all give impetus to farmer demand."

In contrast to the synthetic nitrogen industry, whose great development has been comparatively recent, the phosphate industry of the U. S. is much older, and the competitive aspects more stable. Nevertheless there have been important recent developments here too. Two recent TVA advances in the field of phosphorus were referred to which it is said will accelerate the production of phosphatic fertilizers from western deposits. "These are (1) the development and wide-scale introduction of calcium metaphosphate containing 62 to 64 per cent phosphorus pentoxide, and (2) the more recent development of superphosphoric acid, containing approximately fifty per cent more phosphorus pentoxide than the normal commercial product. At least one new plant is under construction in the western area to utilize these developments. The high concentration of plant nutrients in these products makes it economically feasible to ship them over a wide area from the point of production."

Another technological change in the phosphate fertilizer industry has been the production of ammonium phosphates (primarily 16-20-0, 11-48-0 and 13-39-0) and more recently diammonium phosphate (21-53-0). During 1957 almost 50,000 tons of these new materials were used for direct application, and an upward trend in use pattern was indicated as farmers become

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familiar with their advantages—which include high analysis, high water solubility, and chemical combinations of nutrients. These new materials, the TVA staff believe, "offer promise of being ideal for use in the changing trend toward liquid mixed fertilizers to supplement the great growth of the low cost nitrogen solutions and anhydrous ammonia."

Another apparent trend is the use of liquid phosphoric acid as a straight fertilizer material, primarily on the west coast, or in the form of liquid mixed fertilizer. Until '49 less than 6,000 tons had been used in any one year, but by 1957 its use had tripled to 18,000 tons. With increased supplies becoming available at reduced prices, TVA officials believe it may continue to expand rapidly in use for the future.

Another factor referred to which, it was indicated, promises to result in a greater use of liquid phosphoric acid is development of super phosphoric acid (equivalent to 105% phosphoric acid in terms of P_2O_5). "If favorable freight rates are established on this type of material," it was predicted, "another step forward will have been taken in aiding farmers to obtain better fertilizers more economically. This material, in addition to being highly concentrated, offers some promise of helping the liquid mixers in their technical problems of mixing liquids which will not 'salt out,' 'gel,' or form precipitates which clog spreading equipment."

The changes in the potash industry have been primarily in the direction of a switch from reliance on imported and by-product material to growth of a sound and dependable domestic industry. The U. S. is now completely self-sufficient on potash supplies. Capacity of mines located on the North American continent is well over two million tons and can be expanded rapidly if the need arises.

Discussing changes in the use of fertilizer by the farmer, it was pointed out that the government's acreage control program has helped build demand for more fertilizer.

"More farmers throughout the nation are fertilizing more crops, using higher rates of application. The trend has been toward more use of fertilizers on hay, pasture and cover crops. Yet there remains a tremendous acreage of these crops which is not fertilized and even most of these acres that are fertilized receive very small amounts per acre in comparison to college recommendations.

"One of the more important factors contributing to efficient and expanded use of fertilizers over the past few years, especially on soil conserving crops, has been the bringing together of fertilizer manufacturers, distributors and dealers, with the public agricultural agencies, in developing educational programs involving manu-

(*Continued on Page* 102)

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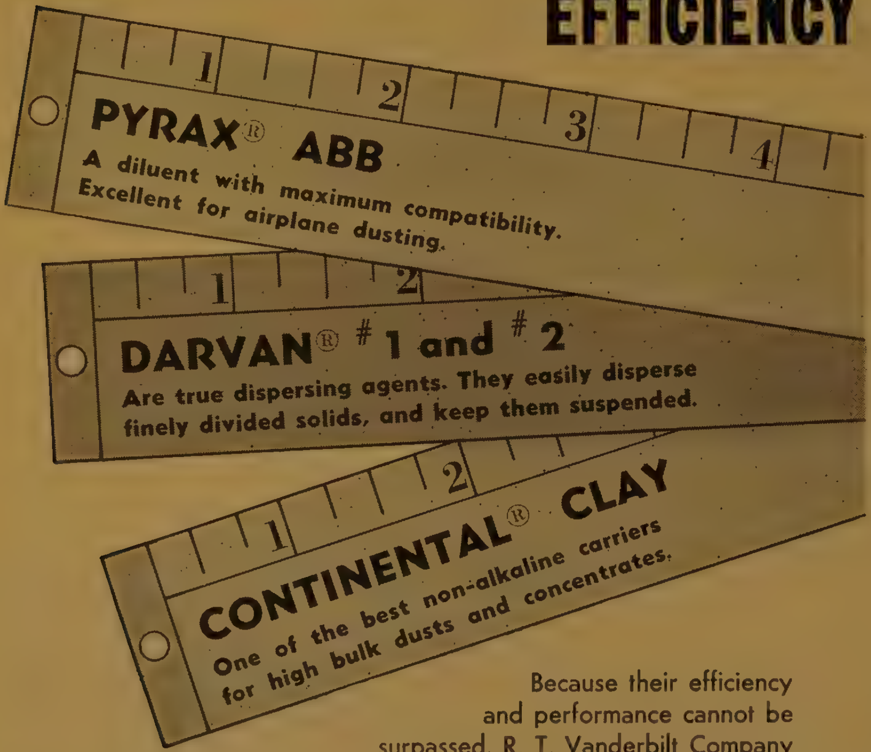
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New Fertilizer Firm

Farm Chemical Corp., Bay St. Louis, Mo., has been incorporated with capital stock of $25,000 to manufacture fertilizer.

•

Redesignate Division

The Shellmar-Betner Division of the Continental Can Co., Mt. Vernon, Ohio, has been renamed. The new designation is Flexible Packaging Division.

•

Cyanamid Selects Perkins

Thomas L. Perkins has been elected chairman of the American Cyanamid Co., New York. He has been a director since 1951.

Mr. Perkins is a senior partner in the New York law firm of Perkins, Daniels, McCormack & Collins.

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To Sell In Italy

The United States Rubber Co., New York, and the Rumianca Co. of Turin, one of Italy's largest chemical firms, will jointly form a new company in Italy to manufacture and sell a line of chemical products developed and manufactured by the rubber company's Naugatuck Chemical division.

The new company, to be called Naugatuck-Rumianca, S.p.a., will have its headquarters in Turin. Among the products it will make and sell are Naugatuck's line of agricultural chemicals.

•

DDT Plant In Brazil

The Fongra plant in Suzano, Brazil, a joint operation of Farbwerke Hoechst A. G. of Frankfurt-Hoechst, Germany, and W. R. Grace & Co., New York, has started operations. The plant will concentrate on making DDT, the first time this insecticide has been produced in Brazil.

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On Safety Panel

C. S. Griffith, superintendent of the Cincinnati plant of the Virginia-Carolina Chemical Co., Richmond, Va., will be a panel speaker at the Fertilizer Section of the National Safety Congress, Oct. 20 - 24 in Chicago.

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Olin Mathieson Picks King

W. Adrian King has been appointed vice president of the chemicals division of the Olin Mathieson Chemical Corp., Baltimore, Md. Mr. King formerly was general manager for the industrial chemicals division.

He joined Mathieson in 1953 as director of sales the hydrocarbon division.

Heads Insect Section

Dr. Hyman S. Henderson has been appointed head of the Stored Product Insects Section of the Agricultural Marketing Section, U.S. Department of Agriculture. He replaces Dr. Randall Latta, who has accepted a position with ICA.

Dr. Henderson is in charge of research on the development of methods of preventing insect attack on agricultural products during marketing.

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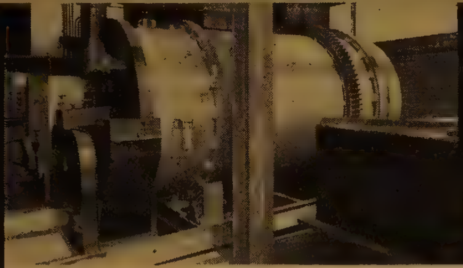

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To Screen Repellents

The research department of the American Smelting and Refining Co., South Plainfield, N.J., recently established a grant-in-aid with the Animal Husbandry Department of an agricultural college for the purpose of screening materials for their effectiveness as livestock repellents.

The Company has invited persons who feel that they have an effective material to submit it for screening. Those interested have been requested to contact Mr. H.B. Jones at 2772 Natchez Lane, Memphis, Tenn.

•

Heads Latin American Sales

Louis J. Vergne has been appointed sales manager - Latin America for the Phosphate Minerals Division of the International Minerals & Chemical Corp., Skokie, Ill. He is responsible for IMC's Phosphate rock sales in Mexico, Central and South America, and the Caribbean area.

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To Manage Co-op Division

Ellis S. Halley has been appointed manager of the Seed and Plant Food Division of the Farm Bureau Cooperative Association, Inc., Columbus, Ohio. He has been advertising manager of the cooperative since 1956.

•

Dedicate Canadian Plant

Pennsalt Chemicals of Canada Ltd. has opened a chemical specialties plant at Oakville, Ontario. The dedication of the plant marked the second official opening of a Pennsalt manufacturing plant outside the United States in less than a month.

Industrial Quimca Pennsalt, S.A., a wholly-owned Pennsalt subsidiary in Mexico, recently opened a new chlorine-caustic plant at Santa Clare, a suburb of Mexico City.

•

4 du Pont Appointments

New assignments for four men in biological chemicals sales have been announced by the Du Pont Grasselli Chemicals Department. Merle E. Ward, who has been manager of Agricultural chemicals for Du Pont Company of Canada since this company was organized, has been assigned to Wilmington, Delaware, as general product manager of agricultural chemicals. He succeeds Jack M. Zimmerman, who moves to the post of assistant district sales manager in Houston, Texas.

Dr. Dale E. Wolf has been transferred from assistant district sales manager in Philadelphia to the same position in the Atlanta district. Eugene F. Clement, has been transferred to the Atlanta district.

•

Elected To Texaco Board

Langbourne M. Williams, chairman and president of the Freeport Sulphur Co. New York, has been elected a director of The Texas Co., New York.

Mr. Williams has been president of Freeport Sulphur since 1933 and was named chairman of the company in 1957. He is also a director of the B.F. Goodrich Co.

To Address CFA Meeting

Ronald Regan, a motion picture and television actor, will be a featured speaker at the 35th annual convention of the California Fertilizer Association, to be held at the Ambassador Hotel, Los Angeles, Nov. 9 to 11.

Mr. Reagan will speak following a luncheon for delegates and ladies.

Dr. Russell Coleman, executive vice president of the National Plant Food Institute, Washington, D.C., will present an address on the economics of the use of fertilizer and Roy Kennedy, general credit manager, California Spray-Chemical Corp., Richmond, Calif., will talk on the problems of credit in the fertilizer industry.

M. E. McCollam, chairman of the association's soil and improvement committee, and general manager Sidney H. Bierly will present reports on the group's activities during 1958 and list plans for 1959.

•

Henry Gessner, Jr., has joined American Potash & Chemical Corp. as assistant export manager in the company's New York offices.

•

Resumes Duties At Rutgers

Dr. Joseph M. Ginsburg has returned to the United States from a two years' assignment to Israel on the Point-4 program as advisor to the Israeli Ministry of Agriculture in toxicology and plant protection problems.

Dr. Ginsburg has resumed his duties at Rutgers University, New Brunswick, N. J., and the New Jersey Agricultural Experiment Station as a research sppecialist in entomology and toxicology.

•

Planning For Profits

"Planning For Profits" will be the theme of the 1958 National Fertilizer Solutions Convention, Nov. 16 to 18, at the Netherlands Hilton Hotel in Cincinnati, Ohio.

•

Highway Equipment Co., Cedar Rapids, Ia., has appointed C. Meader as district representative.

Deputy State Entomologist

Ralph G. Cooper has been appointed a deputy state entomologist by the Board of Control of the Connecticut Agricultural Experiment Station, New Haven. He will be in charge of gypsy moth control and related field work.

Mr. Cooper had been foreman in charge of the Colebrook, Conn., area. He has been on the station staff since 1925.

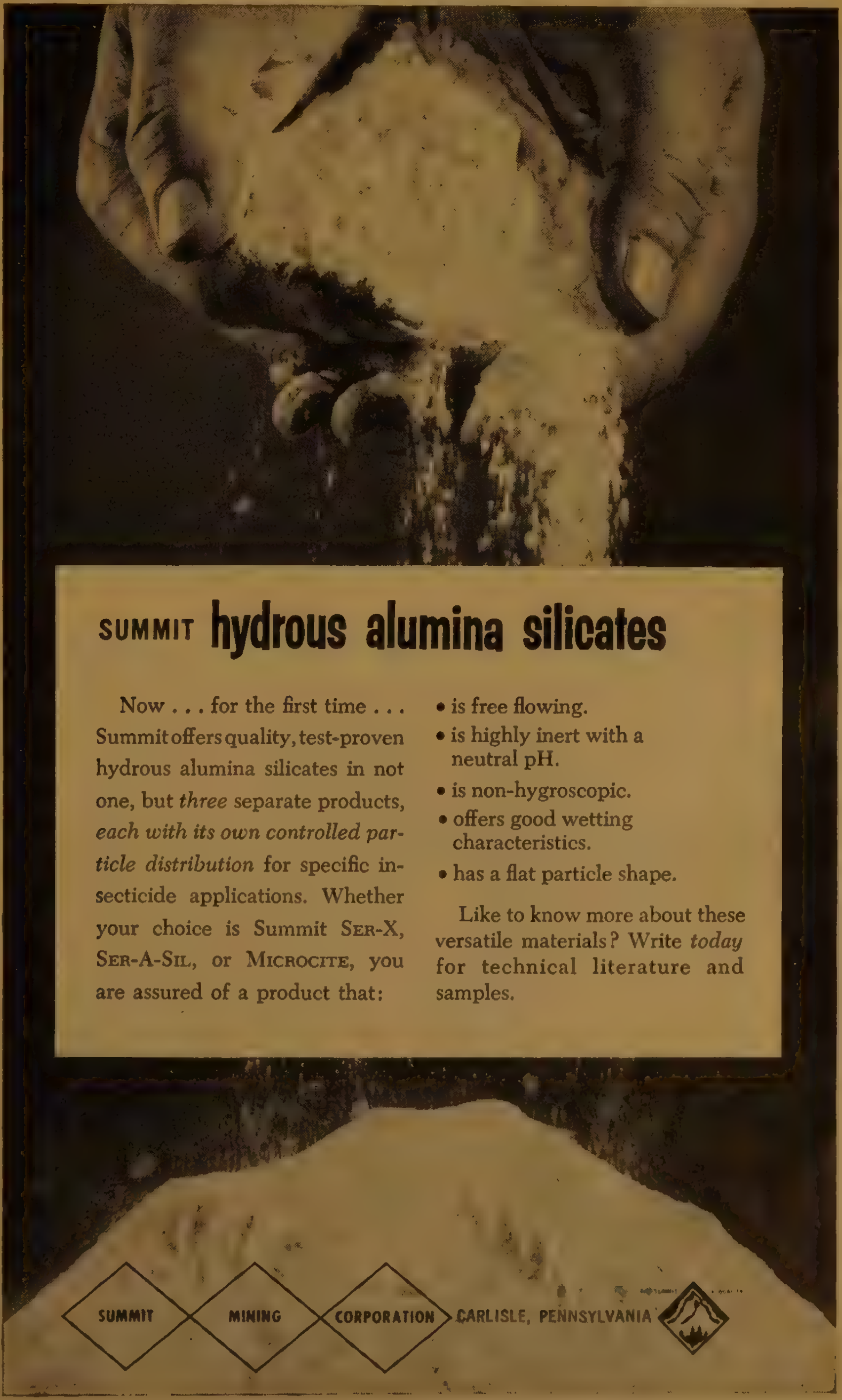
CVPFA Meeting Nov. 19

The Carolinas-Virginia Pesticide Formulators Association will hold its annual meeting at the Carolina Hotel, Pinehurst, N. C., Nov. 19-20.

•

J. W. Gearhart Dies

James W. Gearheart, Essex County (New Jersey) Agricultural Extension Agent, died of a heart attack, July 23, in Denville, N. J. He was 63.



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NPFI Fertilization Methods

The National Plant Food, Institute, Washington, D. C., has issued the second complete revision of a booklet on methods of applying fertilizer, first issued in 1938 by the National Joint Committee on Fertilizer Application.

W. C. Hurlburt, Agricultural Research Service, U.S. Department of Agriculture, was chairman of a special committee that supervised preparation of the revision.

The 20-page booklet lists principles involved in fertilizer use and outlines recommendations for fertilizer application on field crops, vegetable crops, fruits and nuts, and forest trees. A special section is devoted to the application of liquid fertilizer and direct foliar application is discussed.

The booklet, "Methods of Applying Fertilizer," is available from the National Plant Food Institute at 1700 K Street, N.W., Washington 6, D. C.

NPFI NEWS

(*From Page* 82)

at 10:00 a.m., to visit Shell Chemical Co. facilities at Shellpoint.

The afternoon agenda will include the following: 1:00 p.m., visit Western States Chemical Corp. at Nichols to see green phosphoric acid facilities and mixed pelleted fertilizer operations; 2:30 p.m., depart for California Spray-Chemical Corp. to observe nitric-phosphate facilities.

The cooperating companies in the school will prepare information sheets on their respective processes and products, and will provide guides for the tour through their plants.

Grant to Univ. of Cal.

A $2,500 grant has been awarded to the University of California, Davis, by the National Plant Food Institute to support a graduate research fellowship in agricultural education in 1958-59.

The grant enables Roy Lippert, who was selected as the fellowship recipient to conduct a study on the effectiveness of demonstration plots as teaching aids.

Mr. Lippert will set up plant nutrition demonstration plots throughout the State of California and will work with vocational agriculture teachers and also with county farm advisors of the University of California Agricultural Extension Service.

In South West

Donald Heads Research Committee

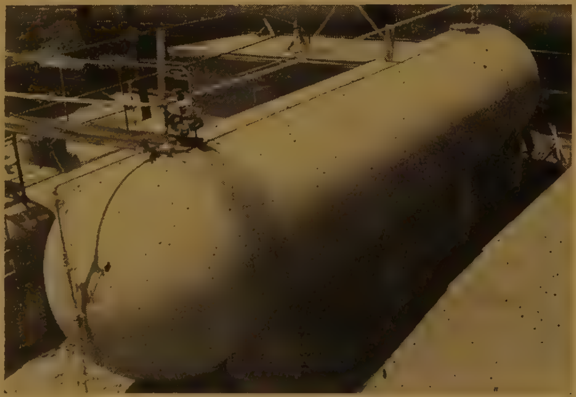
Leroy Donald, Monsanto Chemical Co., was named chairman of the National Plant Food Institute's Southwest Research and Education Committee at a meeting in Galveston, Texas, July 17.

The committee also selected Dr. Robert Beacher, NPFI Southwest Regional Director, as secretary. Committee members met with Mr. Beacher and Dr. Russell Coleman, NPFI Executive Vice President, at a luncheon meeting in the Buccaneer Hotel.

The Institute's program of research and education in the Southwest was reviewed at the session, and the group approved the program projects as outlined by Mr. Beacher. Most of the discussion centered around NPFI's proposed county promotion program, which is slated to get underway this fall in Louisiana, Arkansas and East Texas.

Committee members in attendance included: A. B. Beasley, Spencer Chemical Co.; I. A. Irwin, Virginia-Carolina Chemical Corp.; Dr. N. D. Morgan, American Potash Institute; Floyd W. Prather, Central Texas Fertilizer Co., Inc.; R. W. Scanlan, Phillips Petroleum Co.; and G. A. Wakefield, Olin Mathieson Chemical Corp., who substituted for Dr. U. S. Jones.

The third meeting of the committee is scheduled for early December during the Arkansas Fertilizer Conference at Fayetteville.



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BREVITIES

Philip A. Sawyer has been appointed assistant sales manager of Wilson & Geo. Meyer & Co. Intermountain, an affiliate in Salt Lake City, Utah, of the Pacific coast agricultural and industrial chemicals firm. Mr. Sawyer had been assistant manager of agricultural sales in the Los Angeles area.

AC

William N. Brinson, Indianapolis plant superintendent for Kingsbury & Co., died of a heart attack last month. He was 51. Mr. Brinson had been plant superintendent for the American Agricultural Chemical Co. in Charleston, S.C.; the Michigan Fertilizer Co. in Lansing, Mich.; and the Naco Fertilizer Co. in Charleston, S.C.

AC

Allen T. Fuller, Jr., has been appointed assistant sales manager for the National Northern Division of American Potash & Chemical Corporation. T. H. Wrigley has been named to replace Fuller as manager of administrative services.

AC

United States Borax & *Chemical* Corporation has announced the appointment of P. J. O'Brien as vice-president, production and engineering, and the appointment of R. F. Steel as vice president, finance and administration.

AC

Six Tours were featured at the field Day of the Connecticut Agricultural Experiment Station at the Lockwood Experimental Farm in Mt. Carmel, Aug. 16. The tours were arranged by Dr. Saul Rich.

AC

Barney A. Tucker, vice president of the Knoxville Fertilizer Co., London, Ky., has been named chairman of the agriculture committee of the Kentucky Chamber of Commerce.

AC

The Summer Tour of the Ohio Pesticide Institute was held Aug. 12 and 13 at the Ohio Agricultural Experiment Station in Wooster, Ohio.

AC

The J. B. Beaird Co., Shreveport, La., has opened a district office in New York. R. W. Rademacher is manager of the eastern division.

AC

Thomas N. Wright has been named sales manager of the Rockland Chemical Co., West Caldwell, N. J.

AC

Seventy Acres of corn research plots, covering nearly a dozen different projects, will be on display at the Michigan State University Crop-Soils-Feed Day, Sept. 5, at East Lansing.

AC

R. P. Thomas, International Minerals & Chemical Corp., Chicago, has been named chairman of the National Plant Food Institute's Midwest research and education committee.

AC

Ketona Chemical Corp., Ketona, Ala., is expanding its facilities for the production of prilled ammonium nitrate and ammonium nitrate-limestone.

AC

The Iowa Agricultural Limestone Assn., Inc., Des Moines, voted recently to change its name to the Iowa Limestone Producers Assn., Inc.

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AGRICULTURAL CHEMICALS magazine
Wayne E. Dorland, publisher
Eleonore Kanar, editor
P. O. Box 31
Caldwell, N. J.
Telephone: CAldwell 6-5520

National Agricultural Chemicals Assn.
Lea Hitchner, executive secretary
Association Building
1145 19th Street, N. W.
Washington 6, D. C.
Telephone: STerling 3-2833

National Plant Food Institute
Executive vice presidents:
Russell Coleman and Paul Truitt
1700 K Street, N. W.
Washington 6, D. C.
Telephone: District 7-0225

The following are the regional offices of the National Plant Food Institute

Northeast Regional Office
Willard H. Garman, director
1700 K Street, N. W.
Washington 6, D. C.
Telephone: District 7-0225

Southeast Regional Office
Samuel L. Tisdale, director
1220 Healey Bldg.
Forsyth, Walton and Poplar Streets
Atlanta 3

Pacific Northwest District
F. Todd Tremblay, Representative
2350 27th Avenue, West
Seattle 99, Washington
Telephone: Garfield 1032

Western Regional Office
Dr. Richard B. Bahme, Representative
550 Kearny Street
San Francisco 8, California
Telephone: Yukon 2-8173, 2-8174

Southwest Regional Office
Dr. Robert L. Beacher, Director
Route 8, Township Road
Fayetteville, Arkansas
Telephone: Hillcrest 2-4552

Midwest Regional Office
(Formerly Middle West Soil Improvement Committee)
Zenas H. Beers, director
228 North La Salle Street
Chicago 1, Illinois
Telephone: State 2-9361

WASHINGTON REPORT

(From Page 64)

rumors that Secretary of Agriculture Ezra Taft Benson might be on the Republican national ticket in 1960.

The Secretary's popularity has been rising in the Capital. One sure sign is the growing frequency with which he is being featured with his family in Washington news-papers.

Secretary Benson is far too realistic to base any hopes for 1960 on any popularity he may have at the present time. For his popularity—with the farmers, at least, is tied directly to farm prices and farm prosperity. A break in prices could have Congressmen back at the White House door demanding that Secretary Benson be fired.

Nonetheless, Republicans are talking about the possibility of Secretary Benson's candidacy for vice-president. Strange as such a development might seem in the light of the various moves over the past few years,—even by members of his own party—to make him walk the political plank, it still seems to be possible that his resurgent popularity with intelligent and realistic segments of the farm population could recommend him as a candidate in '60.

GROUND SPRAYING

(From Page 39)

in many cases has been responsible for unsatisfactory results obtained in some applications. With the modern nozzles available, and the proper mounting of these nozzles, successful coverage of plants can be obtained in most cases.

One of the row crop spraying techniques employed by a majority of commercial operators is the use of at least three nozzles per plant row. One nozzle directly over the plant and a single nozzle directed at an angle from either side.

Sincere and legitimate applicators of agricultural chemicals are constantly building and experimenting with new equipment and techniques for the best possible control of the many agricultural pests. Through their efforts, and with the proper chemical combinations and adequate pressures and volume, excellent control of all insect and fungus problems can be achieved.★

AERIAL AGRICULTURE

(From Page 41)

and the importance of labor-saving equipment is growing.

With surplus World War II aircraft gradually disappearing from the scene, a demand is growing for new models, designed and built specifically for agricultural work. To meet this demand at least half a dozen aircraft manufacturers are planning or already have in production planes aimed at the agricultural market.

Grumman Aircraft Engineering Corp. is testing its bi-wing "Ag-Cat" this summer. Transland Aircraft of Torrance, Calif., a division of Hi-Shear Rivet Tool Co., has received C.A.A. certification of its single-wing Ag-2.

Clark Aircraft, Inc., last November received C.A.A. approval for its Model 1000, an all-metal biplane that closely resembles the Stearman. Since 1955, Call-Air, of Afton, Wyo., has produced 200 of its A-4, A-5, and A-6 models for agricultural use at prices ranging from $7,881 to $10,500.

Piper Aircraft Corp., Lock Haven, Pa., presently is experimenting with a new model specifically designed for aerial application work. Production is scheduled for either 1959 or 1960. In 1957, Piper officials estimated that 254 of the 452 planes it sold were converted for agricultural spraying.

Fletcher Aviation Corp., Rosemead, Calif., has found a market in New Zealand for its FU-24. Helicopters, manufactured by Hiller Aircraft Corp. and the Bell Helicopter Corp., although not designed for agricultural work, have been used for that purpose.

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FERTILIZER REVIEW

(From Page 94)

facture, distribution, and use of fertilizers.

"In the past, much of the mixing, wholesaling and retailing has been built on a high volume, low margin basis. The increased concentration of use in many of the principal agricultural areas and the improved storing condition of fertilizer materials may tend to identify this situation. The internal and external economies inherent in operation of large mixing plants in some instances and the economies of distribution in intensive fertilizer use areas may result in fewer handlers, each doing more business than at present. This should assist in further lowering costs of fertilizers to farmers. Improved methods of handling, such as in bulk or in the convenient liquid and gaseous forms, will also contribute to this general improvement in the economies of distribution.

"One innovation which may have revolutionary consequences for the industry is the soil test. As a result of the use of this objective determination of the soil's need for plant nutrients, many more ratios of plant nutrients than are now available may be needed in varying quantities in a mixing plant's marketing area. Several marketing schemes are being employed in various locations at the present time to meet this new type demand. Fundamentally, each method depends on the use of straight materials mixed in the local area to the ratio prescribed by the soil test. Three methods being employed are bulk-blending, including prescription mixing, multiple hopper fertilizer spreader use, and liquid mixing. Each of these new marketing techniques reduces the cost of mixing, and makes it less necessary to use additives which contribute little to fertility but add weight which leads to additional freight, handling, and storage costs.

"A central feature of these innovations in fertilizer marketing is custom spreading. Because the spreading machines designed to handle three straight materials simultaneously are more costly than conventional machines, it is usually necessary to fertilize more acres annually than are available on single farms in order to secure efficient cost of operation. In addition, studies in some areas of the Midwest have shown that farmers do not like the work of handling and spreading fertilizer. In Illinois where bulk-blending is now being done in 92 small plants, 27 per cent of the total straight materials was handled by these mixers during 1956. Rapid growth in bulk blending has developed in Illinois and in other areas of the Midwest. If this segment of the industry continues to grow, a very great decentralization of mixing operations could occur. With such a development, market structure might be altered considerably with perhaps an improved ability on the part of industry to meet the specific plant nutrient needs of each field on each farm. If this activity is to expand significantly, it may have to overcome some important problems such as securing and maintaining uniform mixtures, and modifying the present seasonal demand for the spreading service.

"Another innovation which indirectly affects changes in market structure is the improved knowledge of economical fertilizer use through research. During the last decade marked improvements in agronomic research relative to fertilizer use and economic interpretation of the agronomic data have been made. Now, instead of investigating the effects of single plant nutrient increases or decreases on crop production, researchers design their experiments so that various combinations of applied plant nutrients are tested simultaneously. The relationships among plant nutrients may thereby be determined, and optimum economic combinations and economic application rates may be ascertained."

COTTON MEETING

(From Page 65)

described by D. F. Martin, entomology research division, Agriculture Research Service of the Department of Agriculture at Brownsville. He reviewed the history of pink bollworm research by the U.S.D.A., which began in 1918.

He indicated that many pink bollworms are taken from the fields in seed cotton and may be carried over from one season to the next in seed cotton, seed, and/or gin trash. Chemical control of pink bollworm was accomplished largely through the application of DDT, he said. Other materials found to be effective include Guthion, Sevin, Methoxychlor, Dilan, and EPN. Several additional promising compounds are being tested in the field and laboratory at the present time, Mr. Martin added.

E. B. Williamson, a Department of Agriculture engineer of Stoneville, Miss., said, in a panel discussion, that the self-propelled, high-clearance applicator rig is proving both versatile and economical in cotton production. In addition to its application in both early and late season insect control operations, the machine performs other jobs, he said. These include the application of liquid fertilizers, herbicides and defoliants.

Because progress in mechanization and other technology of cotton production has reached the point where they no longer can be considered as separate areas of production, Claude Welch, director of the Council's production and marketing division, announced that in future years the conference will be merged with the Beltwide Cotton Production conference. The Cotton Council sponsors both conferences in cooperation with other agricultural organizations. The 12th annual Beltwide Cotton Mechanization Conference, therefore, will be the last such conference to be devoted entirely to this subject, Mr. Welch indicated.

Equipment, Supplies, Bulletins

New Micronizer Booklet

Sturtevant Mill Co. Boston, announces the availability of a new Micronizer bulletin, similar to that released six months ago, but incorporating new information on an additional model now available.

The bookelt discusses the Micronizer's potential in fine-grinding, contains typical grinding information, reveals steam and/or air requirements, includes schematic drawings of the unit. It points out how firms may take advantage of Sturtevant's fine grinding laboratory for custom or experimental grinding work.

The yellow, black and white, four-page fully illustrated brochure may be obtained by writing Sturtevant Mill Company, 103 Clayton St., Dorchester, Boston 22, Mass.

•

Case Wheel-Type Loader

A new wheel-type loader with power boosting torque converter drive is being offered by the J. I. Case Co., Racine, Wisc. Standard equipment includes a self-leveling bucket, shuttle transmission, and power steering.

Designated the Case 420, it is said to be the first low-cost wheel loader designed with sufficient power and stamina to be used for actual production digging assignments.

•

Fluid-Power Vibrators

The Syntron Co., Homer City, Pa., has prepared a data sheet on its water, oil, or air operated, explosion-safe vibrators and vibratory feeders.

The folder gives complete descriptions, data, and specifications for three standard "fluid-power" vibrators and for three standard model vibratory feeders. It is available from the company at 185 Lexington Ave., in Homer City.

•

Pennsalt Defoliant Folder

The Pennsalt of Washington Division of Pennsalt Chemicals Corp., Tacoma, Wash., has prepared a folder describing the defoliation of cotton with Penco De-Fol-Ate, a magnesium chlorate-type cotton defoliant.

•

Pesticide Mixture for Cattle

An emulsifiable concentrate containing toxaphene and BHC to control insects by spraying livestock, fences, garbage cans, and other surfaces in barns, poultry houses and buildings has been developed by Globe Laboratories of Fort Worth, Texas.

The product, to be marketed under the trade name of Glo-Tox, is mixed at the rate of one quart to forty gallons of water for complete kills of ticks, horn flies, and lice on cattle. It also gives good protection against reinfection.

The insecticide can be mixed one quart to 120 gallons of water for killing lice and keds on sheep and goats. One quart of Glo-Tox to forty gallons of water is said to control fleece worms and ticks on sheep.

•

Agricultural Gypsum Film

A sound slide film, "The Uses of Gypsum in Agriculture," is available from the United States Gypsum Co., Chicago.

•

Aeroquip Opens Dallas Plant

The Aeroquip Corp., Jackson, Mich., has installed new plant facilities in Dallas, Texas, for the assembly, proof testing, and inspection of hose assemblies.

Danitra

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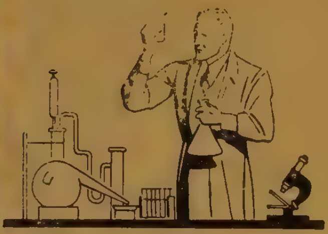
now being allocated to manufacturers and distributors of concentrated, high analysis, water soluble plant foods.



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New Myers Orchard Sprayers

A new line of orchard air sprayers, designed to handle spraying needs of both small and large orchards and groves, has been introduced by The F. E. Myers & Bro. Co., Ashland, Ohio.

The sprayers have been designed for uniform application of all chemical solutions presently used in orchard and grove spraying. The new line is offered in a 224 series and 323 series. Both series of sprayers feature one-man operation with remote tractor-mounted controls.

•

Chapman Pyrethrum Spray

A lightweight aerosol insecticide, designed for both professional use and for resale by pest control operators, has been developed by Chapman Chemical Co., Memphis, Tenn. It is intended for the control of flying insects and for use as a search weapon for flushing out hidden cockroach infestations.

The formulation of dual synergized pyrethrum in the Chapman aerosol is said to be much stronger than ordinary household type insect aerosols.

•

Bower Copper Hydrate

The Henry Bower Chemical Mfg. Co., Philadelphia, has announced the development of a copper hydrate that is said to have promising toxic properties as a fungicide, and rodenticide.

The new compound is more stable than the usual copper hydrate. It is trade-named "Dy-Q-Plex"-1.

Tests on the product are being conducted by the Agricultural Research Service, U.S.D.A. in New Orleans, and private laboratories.

Dow Fumigation Handbook

The Dow Chemical Co., Midland Mich., is offering a 36-page soil fumigation handbook that points out the need for fumigation and lists various methods. Types of nematodes are discussed as well as different types of equipment for the application of fumigants.

Recommendations are listed for the use of Dow fumigants. The booklet is available at 50 cents per copy from the company.

•

Colloidal X-77 Folder

A folder on Colloidal X-77 spreader activator has been prepared by the Colloidal Products Corp., Sausalito, Calif. The folder outlines the use of the adjuvant with herbicides, insecticides, acaricides, and fungicides and lists recommended directions.

•

Merck Offers Gibrel Folders

A set of full color folders, representing approved crop claims for Gibrel, has been issued by the chemical division of Merck & Co., Rahway, N. J.

The folders cover the application of Gibrel on truck crops such as celery, tomatoes, spinach, and cabbage; and on cotton and grapes.

•

Portable Pail Printer

A portable printing device has been developed by the Metal Products Division of Chapman Chemical Co., Memphis, Tenn., for low cost printing on five gallon pails.

Called the Chapco Print-A-Can Printer, the machine will handle up to 500 pails per hour. It is being distributed nationally by Bennett Industries, Inc., Peotone, Ill.

•

Motorless Weighing Machine

A bench model weighing and filling machine for free-flowing materials is being introduced by the Richardson Scale Co., Clifton, N.J. The new machine operates by gravity flow, needs no motor, and delivers 18 to 20 weighings per minute. The new unit is designed for small-scale packaging operations. Capacity is up to five pounds.

HANDBOOK OF

INSECTICIDE DUST DILUENTS AND CARRIERS

THE original publication "Properties and Commercial Sources of Insecticide Dust Diluents and Carriers" prepared by T. C. Watkins and L. B. Norton of Cornell University has been brought up to date and completely revised by Drs. Weidhaas and Brann. The new edition contains commercial information as well as data obtained in research conducted at Cornell University, Ithaca, New York.

The book is bound in a flexible leatheroid cover, for handy, practical use.

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Tripolite
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Champion Power Sprayer

The Champion Sprayer Co., Detroit, offers a booklet describing its Champion "600" power sprayer, a heavy-duty unit that has a two hp gasoline engine and delivers three gallons per minute at a maximum pressure of 400 pounds.

The 1958 model is said to have more power, increased pressure, greater capacity, better appearance, and longer life than previous models of the "600" sprayer.

•

Engine Driven Iron Pumps

The Marine Products Co., Detroit, has developed a low cost engined driven pump of all-iron construction that is recommended for the transferring or spraying of liquid fertilizers.

The all-iron construction of the Flomax 8 centrifugal pump permits it to withstand the corrosive effects of pumping liquid fertilizers, according to the company. The pump is entirely self-contained, with its own gasoline engine.

•

Three In-One Catalog

The Bin-Dicator Co., Detroit, has prepared a consolidated catalog for three products made by the company for all bulk material level indication and control.

The catalog includes photographs, cutaway, and schematic drawings, outline dimensions, general specifications, special bin and conveyor applications, actual and suggested systems and applications for the firm's products. The company makes the Bin-Dicator, a diaphragm type bin level indicator; Roto-Bin-Dicator, rotating paddle type bin level indicator; and Bin-Flo Aerator, for promoting the flow of dry, finely ground bulk materials. The catalog is available from the company at 13946 Kercheval Ave., Detroit 15.

•

Davidson-Kennedy Folder

The Davidson-Kennedy Co., Atlanta, Ga., has issued a six-page folder describing the company's products and history. Among the processing equipment designed and manufactured by the company for the fertilizer industry are continuous acidulation plants, acid plants, ammoniators, rotary drum coolers and dryers, mixers, screens, breakers, and pulverizers.

•

A New Fungicide, Amobam

Roberts Chemicals, Nitro, W. Va., was awarded U. S. Patent 2844623 on its new fungicide, "Amobam." The product is suggested for controlling rust mite on citrus and other insecticide applications. It is reported to control fungus in soils by applying to the soil salts of alkylene bisdithiocarbamic acid; and combines with calcium hypochlorite in the spray tank to formulate a compound similar to "Thioneb" which has been widely tested and found to be an effective fungicide.

During recent years, Amobam has been used successfully in several kinds of fungus-controlling operations. It has been particularly successful in the development of Ethisul which is a tank mix of Amobam and calcium hypochlorite. According to Roberts Chemicals, field tests proved that disease control in the field will be the equivalent of the successful control secured in the greenhouse. All field test data, they say, was secured in Florida during the winter of 1957-58.

•

Plant Disease Handbook

Dr. Harlan E. Smith, plant disease specialist with the Texas Agricultural Extension Service, has edited the first Plant Disease Handbook for Texas. Sixty-five agricultural authorities throughout Texas contributed to the information in the handbook.

Common plant disease symptoms and other control are discussed for a total of 147 plants. The handbook is aimed at extension agents, vocational agricultural teachers, soil conservation service personnel, nurserymen, pest control operators, insecticide dealers, and others. It is available from the Exchange Store at College Station, Texas, for $2.25 per copy.

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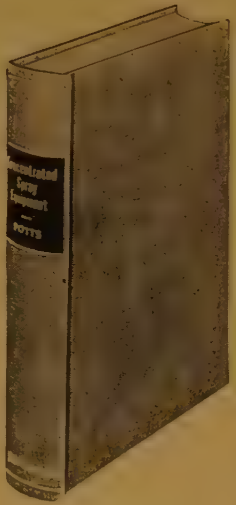

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This book provides a thorough and up-to-date coverage of concentrated sprays, a relatively new concept in the application of agricultural chemicals. It will meet the requirements of custom applicators, growers, foresters, municipalities, etc.

The broad field of concentrated spray application has grown rapidly over the past few years so that today several times as many acres now are treated with concentrated spray as with conventional spraying and dusting. As a result many types of hand, ground, and aerial equipment have been developed for the application of myriad spray formulations and combinations. This book brings together and clarifies the fundamentals and potentialities of this whole subject.

Samuel Frederick Potts, author of this new book has been in the agricultural chemicals industry for more than 30 years. He has published more than 70 articles, booklets, etc., on various phases of the industry. He has also been instrumental in designing new equipment and improvements in equipment for the application of agricultural chemicals.

Richardson Drum Cover

An air-operated, swivel-mounted drum cover for use with Richardson automatic scales prevents dusting and material losses while filling containers with chemicals, salts, and other dry powders, according to the Richardson Scale Co., Clifton, N. J.

Consisting of a metal circular drum cover connected to the spout of an automatic scale by a flexible boot seal, the new unit descends through a six inch vertical travel to cover and seal off tops of containers. Air cylinders hold the cover in position and flexibility and speed are provided by either a swivel-mounted or straight spout.

●

Chemagro Co-Ral Folder

A six-page folder has been prepared by the Chemagro Corp., New York, that contains information and test data on the effectiveness of Co-Ral against cattle grubs, screwworms, hornflies, lice and ticks.

Co-Ral, researched as Bayer 21/199, recently was registered by the U.S.D.A. for use on beef cattle, horses, sheep, swine, and goats. The folder is available from the company at 437 Fifth Avenue, New York 16.

●

Prentiss Offers Tabutrex

The Prentiss Drug & Chemical Co., New York, has announced the commerical availabilty of Prentox Tabutrex, Prentox Pybutrex Concentrate No. 20, and Prentox Pybutrex Concentrate No. 100.

Tabutrex has received registration by the U.S.D.A. for use on dairy and beef cattle to repel houseflies and biting flies and has been registered as a roach and household ant repellent. Pybutrex is a combination of Tabutrex with pyrethrum and piperonyl butoxide.

●

Offer Nicotine Sulfate

The Hummel Chemical Co., New York, is offering a nicotine sulfate containing approximately 40 per cent nicotine. The company lists as uses for the product the control of ants, aphids, and other insects, and use as a raw material for making other nicotine salts.

Stereocide For Calf Scours

Jensen-Salsbery Laboratories, Inc., Kansas City, Mo., has announced that its compound, Stereocide, can effectively control calf scours which resist treatment by conventional antibiotics.

The compound's antibacterial ingredients are Sterosan and Neomycin. Xylocaine, a local anasthetic used to reduce intestinal spasms and pain which often complicate scours, is combined with these ingredients as are mineral salts to replace electrolytes lost by the sick calf and kaolin to reduce loss of body fluids. Stereocide is effective in low concentrations. The average treatment requires from four to eight boluses given over a 24-hour period.

●

Agricultural Hydrator

The Joaquin Agricultural & Engineering Co., Hanford, Calif., has developed a new hydrator for the application of dry agricultural chemicals, such as gypsum, lime, sulfur, and fertilizers, through irrigation systems.

The hydrator, which contains no moving parts, is available in one, two, and three ton units for pressure or gravity irrigation. Complete information is available from the company at P. O. Box 150, Hanford.

●

THE MORGAN SOIL TESTING SYSTEM, a technical handbook of chemical analysis of soils, is again available from the Connecticut Agricultural Experiment Station, New Haven. A charge of $1 a copy is made to cover printing costs of the bulletin which had been out of print for several months.

AC

HUMMEL CHEMICAL CO., New York, is offering barium chloride technical crystals for use in the manufacture of ceramics, dyes, batteries, and insecticides.

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Walter F. Bram has been appointed manager of raw materials procurement and wholesale and export sales for the Smith-Douglass Co., Norfolk, Va. He succeeds Russel Spivey, who resigned recently.

SAFETY SCHOOL

(From page 28)

p.m., "Safety Materials and Services of The National Safety Council," R. L. Benson, National Safety Council; 1:00 to 1:30 p.m., "Fertilizer-Insecticide Mixtures," R. C. Fitzgerald, Smith-Douglass Co., Inc. Streator, Illinois; 1:30 to 2:15 p.m., "Safe Use of Liquid Materials in a Fertilizer Mixing Program," L. L. Lortscher, Spencer Chemical Co., Columbus, Ohio; 2:15 p.m. to ——, summary and discussion.

ARI PANEL

(From page 50)

Rabies and Its Control.

Is Animal Protein an Essential Constituent of Swine and Poultry Rations?

Effect of Storage of Grains on Their Nutritive Value.

Shortage of Professional workers in Agriculture.

Current active committees are studying problems in agricultural equipment, agricultural pests, animal breeding, animal health, range and pasture management, soil and water conservation, soil-crop-water relationships, plant composition and fertilizer needs, and economics of fertilizer use.

It must be emphasized that neither the Council nor the Agricultural Board is a government agency. Its composition and that of its committees are not limited to personnel of the U. S. Department of Agriculture and land-grant colleges but it is free to call on all these and eminent scientists from all soures including industry. It does not have its own facilities and personnel for conducting research but it can stimulate research in various fields by pointing out the problems and possible methods of approach.★★

GRAIN STORAGE

(From page 31)

3. Bioassay tests showed that degradation of the ryania in the treated grain was very slow.

4. About 80 to 90 percent of the ryania could be removed from the treated grain by a simple sifting.

5. The residues in the milling fractions of wheat were about equally distributed in the feed and flour fractions and were reduced to relatively small amounts as related to the dosage rate.

6. The moisture content of the grain had no observable effect on the treatments.

7. The commercial grade of the grain was not affected except that of the shelled corn treated with the ryania-sulfoxide formulation, which imparted an objectionable odor.

8. Nine species of stored-grain insects were found in wheat and 16 species in shelled corn. The dominant species in wheat were the dermestids, the lesser grain borer, the flat grain beetle, and the saw-toothed grain beetle; in corn, the red flour beetle, the flat grain beetle, the saw-toothed grain beetle, and Angoumois grain moth.★★

INSTRUMENTATION

(From page 57)

and Mr. Leister of the Renneburg Company in Baltimore, plus the other speakers who have been on the program. Certainly an industry can justify much more additional instrumentation than is currently applied if considerations of post-grade control are considered.★★

BACTERIAL ROT

(From page 47)

made up of each concentration of each material tested. Ring-rot-inoculated seed pieces were treated for 5 minutes and planted immediately. The number of diseased plants in each treatment plot was recorded.

Table 2 gives results. Except for Terramycin 100 ppm, all treatments reduced infection as compared with that in the controls. Acti-dione and Phytomycin gave best control; bichloride of mercury and Semesan Bel were next.

Acti-dione injured the seed pieces. At both concentrations it reduced emergence from 5 to 10 percent. This was the only material that reduced emergence.

Addition of streptomycin sulfate to the solutions increased effectiveness of all the tested materials except Terramycin 500 ppm and 200 ppm. The combination treatments did not injure the seed pieces, nor, except for the Acti-dione combination, did they reduce germination.

Results indicated that seed treatment with a combination of streptomycin sulfate and a suitable disinfectant may be a practicable means of controlling ring rot and perhaps other potato diseases spread during preparation of the seed tubers.★★

TABLE 3

The iron-manganese ratio of various spray treatments

Treatment	Ratio	Foliage injury
Captan	1.78	None
Captan + lead arsenate	1.48	None
Glyodin	1.70	None
Glyodin + lead arsenate	1.17	Injured
Sulfur	1.50	None
Sulfur + lead arsenate	1.48	None
Lead arsenate	1.20	Injured
Control	1.31	None

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Deck Heads Lindsay Division

George T. Deck has been appointed vice president and technical general manager of the new Lindsay Chemical Division of the American Potash & Chemical Corp., at West Chicago, Ill. The division is the result of a recent merger of Lindsay Chemical Co. with AP&CC.

•

Accident Prevention School

The first of five two-day regional accident prevention schools, sponsored by the Fertilizer Section of the National Safety Council with support from the National Plant Food Institute, was held for the Northeast region at Statler Hall, Cornell University Campus, Ithaca, N. Y., August 14 and 15.

For Sale:

FOR SALE: Good Rebuilt Equipment at Savings of HALF and MORE; Hersey Gas Fired Dryer 5′ x 26′ Sperry and Shriver Filter Presses upto 42″ now in stock; Stainless Lancaster Rotary Rector 50″ x 7′4″; 5000 Gal. S/S mixing Tanks; 40 HP; Pebble Mills size upto 8′ x 8′; NEW Falcon Ribbon Blenders all sizes; Hammer Mills upto 100 HP; Sifters by Rotex, Patterson, Robbins; all sizes; Send for Bulletin "FIRST FACTS." FIRST MACHINERY CORP. 209-289 Tenth St., Brooklyn 15, N. Y.

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ASCENSION FERTILIZER CO., Donaldsonville, La., has been granted a charter of incorporation.

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Garman On A.E.A. Board

Dr. Willard H. Garman was elected to the board of directors of the American Society of Agronomy at the society's annual meeting last month at Purdue University. Dr. Garman is Northeast Regional Director and Chief Agronomist for the National Plant Food Institute.

This will be Dr. Garman's second term on the ASA Board. He served as a member of the group in 1950 when he was president of the society's Southern Branch.

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St. Regis Paper Co.	77
Sturtevant Mill Corp.	17
Summit Mining Corp.	97
Tennessee Corp.	8
Texas Co.	Aug.
Texas Gulf Sulphur Co.	Aug.
Thayer Scale Co.	Aug.
Thomas Alabama Kaolin Co.	June
Thompson, Friar M., Jr.	114
Townsend, Dr. G. R.	114
Transland Aircraft	40
Union Bag-Camp Paper Co.	60
United-Heckathorn	34
U. S. Borax & Chemical Corp.	13
U. S. Phosphoric Products, Div. Tennessee Corp.	67
U. S. Potash Co.	14
Vanderbilt Co., R. T.	94
Velsicol Chemical Corp.	4
Vitax Limited	108
West Virginia Pulp & Paper Co.	10
Wilson & Geo. Meyer & Co.	June
Wisconsin Alumni Research Foundation	110
Dr. Wolf's Agricultural Labs	114
Woodward & Dickerson, Inc.	108
Yale & Towne Mfg. Co.	June
Young Machinery Co.	Aug.

TALE ENDS

ORGANIC phosphate poisoning has caused the death of at least two farm workers in central Washington, as well as illness of approximately 50 others in the same area this season. Authorities who have been studying the matter blame the upsurge on three things:

1. Familiarity Breeds Contempt.—Until this year, so far as known, no one in the area working with any of the organic phosphates had died from poisoning. (Deaths elsewhere were not "close enough to home.")

2. Hotter weather this season. When the temperatures are in the upper 80's or above, the danger of phosphate poisoning increases tremendously.

3. Greatly increased use of the materials caused by an outbreak of mites and insect pests which thrive in hot weather.

One of the deaths was of an orchard worker who wore anvas shoes and sloshed around in the orchard. Sores on the worker's feet helped inrease his absorption of the toxicant. The other worker was spraying in a hop yard.

Medical men surmised that the second victim was unusually susceptible to poisoning by the material, because he had been spraying for only a few hours, and died in the hospital just two hours after being admitted.

Workers at the U.S. Public Health Service tovicology laboratory in Wenatchee, Wash.—one of the two field stations in the nation set up by the U.S.P.H.S.—are perfecting a urine test of phosphate (particularly parathion) poisoning. This will supplement—and will be incomparably more revealing as to the quantity of the poison in the victim's system — than the chlorinesterase level-blood sampling test now used.

AC

Is Our Face Red Department—*Imagine ouur embarrassment after coming out with a photo of the Bon Air Hotel, in Augusta, Ga., on the cover of our August issue, only to learn a couple of days later that the NACA had switched its meeting place, and would meet instead at the General Oglethorpe in Savannah. Dates the same—October 29-30. Better be sure to switch your reservations, and come October 29th, don't show up at Augusta.*

AC

The "Wonsover," a mammoth 12-ton farm machine that the maker says can perform 460 man-hours of farm work in just 24 hours, has finally made its appearance on the market. We have been hearing about it for several years. Manufactured by the Norton Portland Corp. of Portland, Maine, it sells at nearly $40,000. It is said to plow, harrow, level, fertilize and spray insecticide all in one operation.

AC

Glenn Chemical Company, Chicago, who introduced a promising new insect repellent a year or so ago, predict that the cattle spray market will triple in size within the next couple years as a result of the good reception that has been accorded cattle sprays containing safe, effective repellents. They report a big increase in the volume of fly sprays containing repellents this season.

AC

The picture (below) is a hangover from the June convention of the National Plant Food Institute. Four reclaimed golfers—Dick Ayers and King Ludington of Chase Bag, W. W. Venable of Cornland Plant Foods and John Rice of Liberty Limestone, outfinished apoplexy in a three-set match. A set consisted of best three out of five games, and the Ayers-Ludington combination (left in the photo) took their opponents two sets out of three.

A TYPICAL AGRICULTURAL CHEMICALS SUBSCRIBER SAYS

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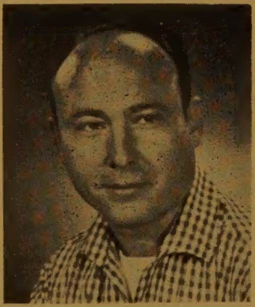

ROBERT W. DANFORTH

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Monmouth, Illinois

. . . the monthly articles keep me well informed on new products and techniques which constantly are being developed. I have found AGRICULTURAL CHEMICALS *to be the one magazine which carries the most information that is of value to me. Now that the new "Custom Applicator" section has been added, the magazine is more than ever a necessity in my business."*

Robert W. Danforth is owner of Danforth Aerial Sprayers, Monmouth, Illinois, an airplane applicating service organization that operates in fourteen midwestern and southern states. This organization sprays, dusts, and applies granules to wheat, corn, soybeans, cotton, alfalfa, pastures, and other crops of the midwest. Mr. Danforth is president of the Illinois Association of Aerial Applicators and is a member of the 1958 Ag committee of the National Aviation Trades Association.

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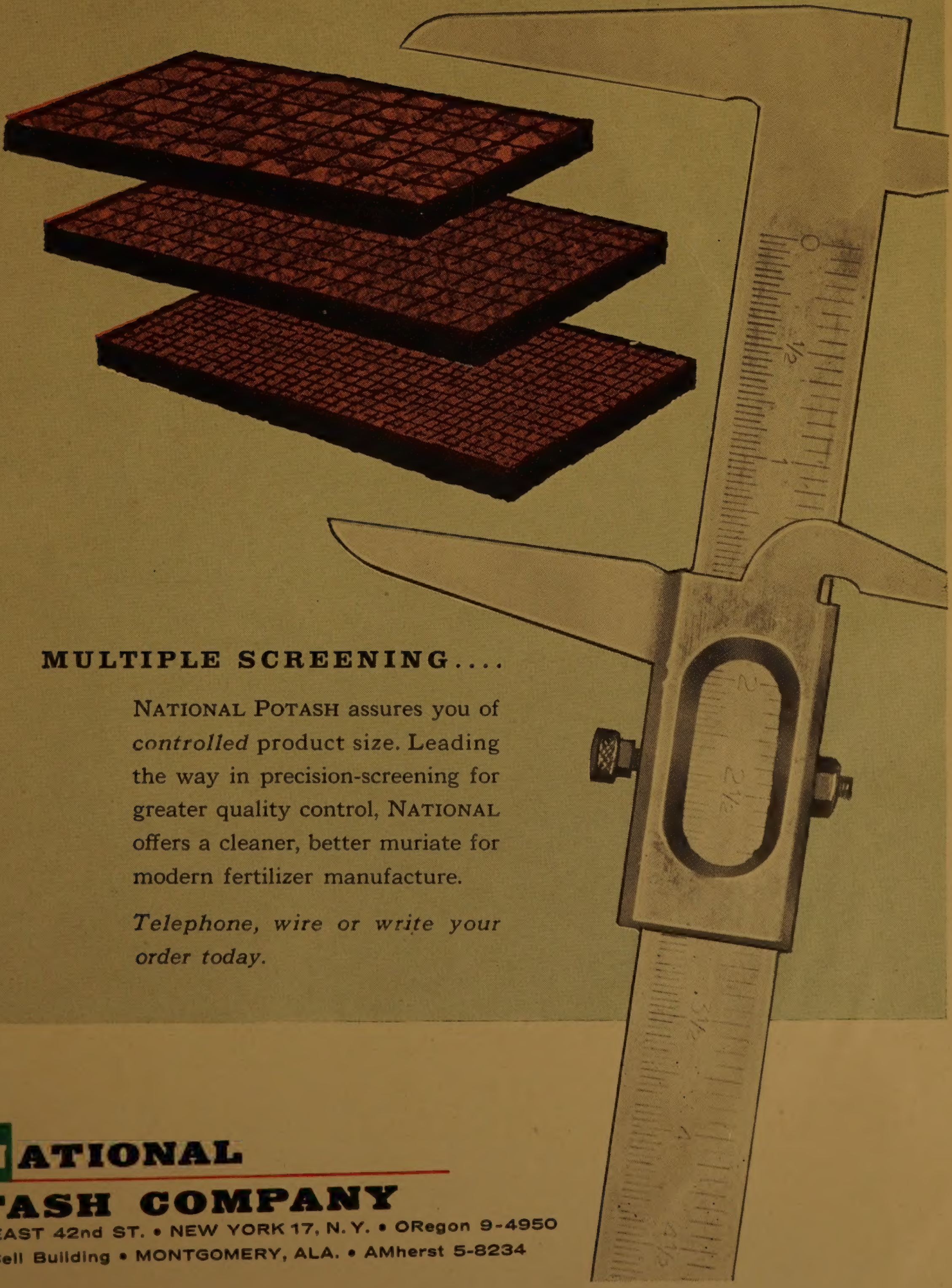

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